JOURNAL of FORESTRY

February
1931

Vol. XXIX Number 2

Published by the
SOCIETY of AMERICAN FORESTERS

Single Copy Sixty Five Cents Four Dollars per Year

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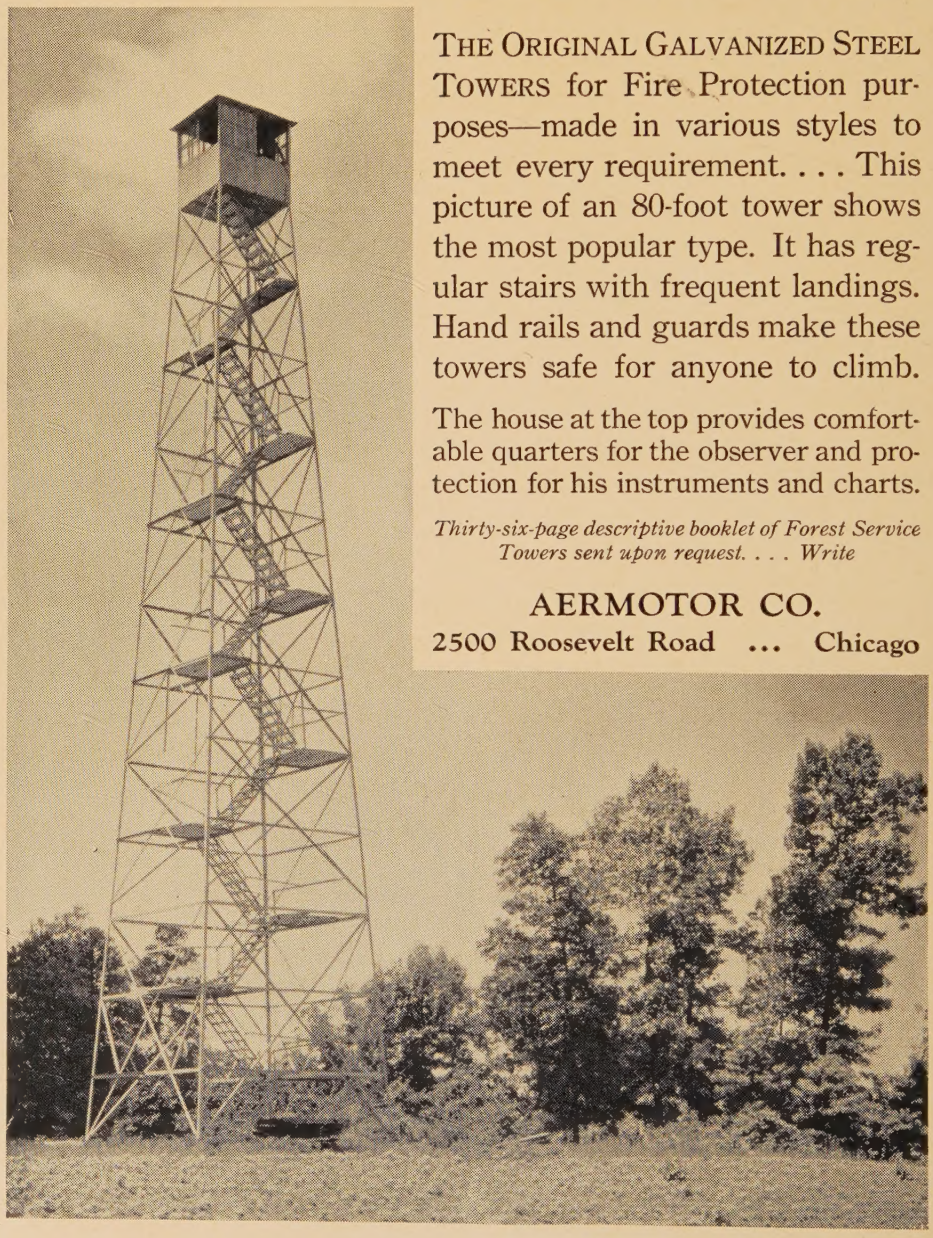

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OFFICIAL ORGAN OF THE SOCIETY OF AMERICAN FORESTERS
A professional journal devoted to all branches of forestry

Entered as second-class matter at the post-office at Washington, D. C.

Acceptance for mailing at special rate of postage provided for in the Act of February 28, 1925, embodied in paragraph 4, Section 412, P. L. and R. authorized November 10, 1927.

Office of Publication, Room 810, Hill Bldg., 839 17th St., N. W., Washington, D. C.

Editorial Office, 231 Giannini Hall, Berkeley, California—Manuscripts intended for publication should be sent to Emanuel Fritz, Editor-in-Chief, at this address, or to any member of the Editorial Staff.

The JOURNAL appears eight times a year monthly—with the exception of June, July, August, and September.

The pages of the JOURNAL are open to members and non-members of the Society.

Missing numbers will be replaced without charge, provided claim is made within thirty days after date of the following issue.

Subscriptions, advertising, and other business matters should be sent to the JOURNAL OF FORESTRY, Room 810, Hill Bldg., 839 17th St., N. W., Washington, D. C.

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JOURNAL OF FORESTRY

VOL. XXIX FEBRUARY, 1931 No. 2

EDITORIAL

ANNUAL MEETING IMPRESSIONS ON THE EDITOR

THE THIRTIETH annual meeting of the Society of American Foresters was a significant and eloquent demonstration that forestry is not a branch of another field but a definite and distinct field in its own right and that it is big and broad enough to have branches and departments of its own. At one time an annual meeting of the Society would be devoted largely to papers and addresses of a general kind, usually directed toward moulding public sentiment. The thirtieth meeting however, was marked less by general papers than by those of a specific and technical nature, less by papers on forestry as a whole than by papers in its branches. In a scholarly address at the annual dinner Zon referred to forestry as having become of age. What he meant, no doubt, was that forestry is "getting somewhere." Forestry will be some time longer "becoming of age"; it is just appreciating how big its field is, and it seems to be eager to get into and develop each one of its branches. Present-day American forestry is not as impatient as it once was thought to be; there is more discretion in its attack of the larger problems of national forestry. It may still need the watchful care of its wise "forefathers," but it is surpassing even them in vitality.

Perhaps the most outstanding features of the recent meeting were the large and representative attendance from every region and every branch of forestry; the large attendance of the pioneers; the inspiring quality of the younger leaders; and the presence on the program of such a considerable number of specialists and of foresters in private employ, whose papers, incidentally, were of a quality that would do credit to any technical or professional society. In the words of Graves it was, "A great inspiration in recollection of those (the early formative) days to see at this gathering a representation of a profession well established and engaged in a great variety of forestry activities in all parts of the country." It must have been a great satisfaction to the founders of the Society who were present to see their child grown to such lusty and promising manhood.

The papers by foresters in private employ were the most vital yet delivered

before the Society on commercial forestry. They were certainly well within the realm of realities. They brought the theorizer and the forestry purist face to face with the interdependence of forest production and forest utilization, that silviculture is a means and not an end, and that the profits or other benefits of private forestry must be demonstrated *by foresters* to win its practice on privately-owned lands. We still have a long way to go in private forestry, the one field in which we have failed to make adequate progress. Private forestry today is characterized by what foresters have failed to do rather than by what timberland owners have accomplished. There still exists a huge gap between the vast amount of information and data we have collected and our putting it into form for easy digestion and use.

The relation of forests to water resources and to erosion control received more than its usual attention. The papers bearing on this branch pointed to a door wide open to an enormous field for exploration by foresters and to a public problem possibly equalling in magnitude and national importance that of adequate wood supplies.

Public land policy took the time of an entire afternoon session. The papers and discussion again showed that a clash between public and private interests is inevitable when the two are not in harmony.

The presentation of committee reports was marked by a desire to keep out of wordy discussion and to clearly separate controversial matters from principles.

American forestry owes a deep debt of gratitude to its founders. Some may have over indulged in theory, but the accumulation of facts that accompanied their efforts is now the basis of our further progress. Theorizing usually precedes practice. We are definitely in a period of practice, and forestry seems to be due for a rapid expansion in all its branches, in which the technical man will have his day.

Other features of the meeting include evidence of the solidarity of the profession, its high percentage of members of leader calibre, the cordial fellowship among foresters, and the growing strength of the Society of American Foresters in every field of forestry endeavor. Any forester who failed to attend the thirtieth annual meeting of the Society for fear it would be given up to theorizing missed his greatest opportunity for inspiration.

PRESIDENTIAL ADDRESS[1]

By PAUL G. REDINGTON

President, Society of American Foresters

In this address the President reviews the forestry activities and accomplishments of the Society. It reports constant and substantial growth, progress, and strength and is a convincing justification of the Society's employment of an Executive Secretary.

THE YEAR 1930 has recorded steady progress in Society affairs. The business end of the organization has functioned smoothly—much more so than in previous years, due largely to the high character of work performed by the Executive Secretary and by Miss L. A. Warren and her assistants.

The Society—in my opinion—made no mistake at the 1928 annual meeting when it authorized the Council to provide means necessary to employ an executive secretary. The finances were secured through contributions from the membership, and in April of this year Mr. W. R. Hine, selected by the Council, started in on his work.

There were among the membership some who questioned the need of an executive secretary. Had they appreciated to the full the heaviness of the burden of work which had in the past fallen on the shoulders of the regular officers (all of them with their own work to do) the doubters, I feel sure, would have joined with the great majority of the members in their desire to see the work of the Society proceed in an efficient and progressive manner.

We are a large organization of professional foresters—perhaps the largest in the world. Our membership now numbers 1740, made up as follows:

Honorary,	14
Fellows,	11
Seniors,	708
Juniors,	949
Associates,	52
Corresponding,	6

The increase in membership from a year ago was approximately one hundred and forty-four, and we have membership lists pending which will add many more to the Society's roster.

While dealing with the membership subject it is pertinent to call to your attention that during the year the Executive Secretary has secured information from various sources as to name and number of professional foresters extant, throughout the country. Many of them are not members. Specifically it has been ascertained that 1576 professional foresters—who have the qualifications for membership—are not found within our organization. The cards regarding these foresters have been sent to the Sections and we hope through their proselyting work that the year 1931 will show a great increase in membership.

[1] Presented at the 30th annual meeting of the Society of American Foresters at Washington, D. C., December 29-31, 1930.

Incidentally the investigation which has disclosed the facts hereinbefore given has brought to us very valuable information of many sorts as to the class of work being done, regional distribution of foresters, and the like. Within the near future it is planned to send a questionnaire to the membership through the return of which we shall be better able to cater to the needs of foresters generally. The delinquency of dues was very small, numbering only 19 out of the entire membership. This is surely a wholesome condition and indicates that the members have the welfare of the Society close at heart.

I would like to list briefly, in addition to those mentioned before, the principal projects which have been developed through the office of the Executive Secretary. He has been able in large degree to become personally acquainted with hundreds of members of the Society by attending sectional meetings throughout the country, thereby keeping many correctly apprised of the parent Society's aims and activities. He has assumed the responsibility for the handling of the JOURNAL OF FORESTRY advertising matter and has carried on a compaign to increase the circulation of the JOURNAL. He has been in constant touch with the officers of the Society in regard particularly to matters of policy and has taken on the large amount of correspondence and other work incident to the running of a large and growing organization. The membership has been kept in close touch with his activities through notes contributed by him in the JOURNAL. He has assisted in large degree the Committee on Meetings. Unfortunately for all of us he is in ill health at present and may not be able to be with us at our sessions. A report of his work will be submitted at the meeting on December 30th.

It has been my privilege to meet many of the members of the Society during the year in connection with my official travel. Meetings of the California and Denever sections were attended. At the Denver meeting on December 10th last, an unusual feature was the presence of 25 students of the forest school of the Colorado Agricultural College. Their interest in the Section program was very keen. The Society will do well to consider seriously in the near future the establishment of a student membership grade, at a very nominal fee. It is a pleasure to testify the 17 sections are indeed active. This augurs well for the future of the Society. It is indispensable to the success of our work.

The Council has held two meetings within the year and it is hoped the time may soon come when a quorum of the Council may be in attendance at the regularly scheduled quarterly meetings. I want to take this opportunity to express to the members of the Council deep appreciation of the aid given by them to the general officers.

One of the most interesting events of the year was the reception given at Washington by the Society to the Latin-American delegates attending the Inter-American Conference on Agriculture, Forestry and Animal Industry. A bond of good will and understanding was forged that should tend to advance forestry practices throughout the two continents.

The committees of the Society have

functioned well indeed. The Allen Committee on Industrial Forestry will present its report with the recommendation that it be discharged unless ways and means can be found to finance, in reasonable degree, a continuance of its activities. This is a matter which will receive the attention of the Council.

A report is to be presented at this meeting by the Committee on Forest Education. The thanks of the Society are due in very large measure to Colonel H. S. Graves and Professor C. H. Guise for the work they have put in on this notable study.

The assiduous work of the Moore Committee on Forest Policy is bringing results. The latest draft by the Subcommittee has been submitted to the full membership of the main Committee, and printed copies have been sent to all members of the Society. The report will be discussed at this meeting and should engage the real interest of those present. Following the discussion it is hoped that but little time may elapse before the membership will have the opportunity to vote on the proposals.

The subcommittee of the Policy Committee was asked recently to draft a plan for the reorganization of the so-called conservation agencies of the federal government—a matter which, as you all know, has been under consideration by various high government officials, from the President down. The Council approved the committee project, the program was drawn up and submitted by the Executive Secretary to President Hoover, who acknowledged it as follows:

MY DEAR MR. HINE:

I wish to thank you for your note of November 13th and for the attached report. I have read it with a great deal of interest.

Yours faithfully,

HERBERT HOOVER.

The program on this important matter was published in the December, 1930, issue of the JOURNAL.

One of the projects recommended in the report of the Committee on Forest Policy has lately come to fruition. I refer to the National Timber Conservation Board established by President Hoover. It has a membership of thirteen, as follows: Secretary Lamont, Chairman; Secretary Wilbur, Secretary Hyde, Mr. George D. Pratt, Dr. John C. Merriam, Mr. Charles Lathrop Pack, Mr. L. J. Tabor, Mr. John Kirby, Mr. Wm. R. Ritter, Mr. D. C. Everest, Mr. John W. Blodgett, Mr. Carl R. Gray, and the President of the Society of American Foresters. Secretary Lamont as one of his first acts as Chairman has tentatively designated membership of an advisory committee to the Board. Several of the members of this suggested committee are also members of the Society of American Foresters. The first meeting of the Board is to be held on January 7, in Washington.

The proposed task of the Board is to compile the essential facts of production conditions and trends in the forest industries, analyze and interpret them and develop recommended policies and programs of public and private action which may secure and maintain an economic balance between production and consumption of forest products and lead to a perpetuation of the forests and the timber based industries. It is the expectation that forest protection and re-

newal will come prominently into the consideration of the Board.

Most of you are aware that early in the year the Vice-President appointed five Senators to serve as a select committee on wild-life conservation. This committee has been most active during the year holding hearings in Washington and elsewhere throughout the United States. It was largely due to the work of this committee, aided by conservation organizations, notably the Izaak Walton League, that the lake region of Northern Minnesota within and adjacent to the Superior National Forest was saved from the despoliation that would follow proposed flooding projects by a large industrial concern of the region. Congress stipulated in effect that there should be no further raising of water levels without its consent. A hearing was held by the Senate committee at Wabasha, Wisconsin, in July. There appeared before the committee, army engineers, fish culturists, biologists, game administrators, and foresters. Mr. C. G. Bates, a member of the Society, gave a succinct but extraordinarily interesting statement in reference to the erosion situation of the Upper Mississippi Valley. His report has recently been published and I hope every member interested in the subject will peruse it. The Senators were of the opinion that the erosion problem should receive the active consideration of law-making bodies.

The Council has before it for consideration a proposal to extend the purview of the investigational program of the McSweeney-McNary Act through inclusion of a specific section which will authorize investigation into all angles of the erosion problem in the United States.

The matter of game protection and perpetuation on forest properties is coming more clearly into the picture every year and many forest administrators both public and private are greatly desirous of securing salient information on the relation of bird and mammal life to forest environment. This demand is being met in part by the Biological Survey investigations which are now in progress under the McSweeney-McNary Act, by the work of Mr. Aldo Leopold for the Small Arms and Ammunition Manufacturers Institute, by the attention given in increasing measure by the Forest Service to game problems and through investigation of State bodies such as universities and the fish and game commissions. From both recreational and economic viewpoints the wild life of the United States is important indeed and it is hoped that resources will be available in such amount in the next decade as to permit a very large extension of zoological research particularly in relation to forests and forestry.

The question of the disposition of the unreserved unappropriated public domain has long been before the country. The misuse of the timber and grazing land of the public domain due to the lack of legislative authority to properly administer it, goes on apace. Within the year meetings have been held by the President's commission on the conservation and disposition of the public domain. It is understood that a report will soon be forthcoming from the Garfield committee. The recommendations sent to the President urged that as organic resources were involved the con-

trol of grazing and the forests remaining on the public domain should be placed for handling in the Department of Agriculture.

The Hoover-Young Commission appointed to investigate all aspects of the water situation in California called upon the California Section of the Society to give to it the relationship which forests bear to water conservation. A report for the Section was made by Messrs. Show and Kotok and made very clear the influence of forests on the water supply and its conservation. I commend the reading of this report to all members of the Society.

The year witnessed a change of editorial supervision of the JOURNAL OF FORESTRY. Dean S. T. Dana indicated that he desired to withdraw because of his other heavy responsibilities. The Council regretfully voted to accept his resignation. His successor, Professor Emanuel Fritz, has now actively taken over the duties of Editor.

Through the medium of a committee of the Appalachian Section, Mr. C. F. Korstian, chairman, there was prepared this year a cumulated index of the articles in the Society's publication from its beginning. It appeared reasonable to make a small charge to the members who desired copies of the index. About 700 copies have been sold, and it looks as if a large additional number will be disposed of in the near future. The value of such an index is beyond question and the Society is under obligation to Mr. Korstian and his commmittee members for the work they put into its compilation.

Thirty years ago, on the 30th of November, 1900, when many of us did not know what forestry was, the Society of American Foresters saw its beginning at a meeting in Mr. Gifford Pinchot's office in Washington. There present were Messrs. Pinchot, O. W. Price, W. L. Hall, Ralph Hosmer, Thomas Sherrard, E. T. Allen, and Henry S. Graves. Overton Price has crossed over the Great Divide, to the great sorrow of those who knew him. All the other members of that original group are living and at least four of them are expected to be in attendance at some time or another during the sessions of this meeting. Forestry thirty years ago was literally in its infancy in this country, but those men anticipated with clarity of vision the need for an organized body of professional foresters. They builded on a firm foundation and we of the later days have reason indeed to express our deep and abiding gratitude and appreciation for the action taken by the founders of the Society. May they live long and prosper and may we all strive to give our best services to the organization that has been so helpful to us in our professional careers.

A LOOK AHEAD IN FORESTRY[1]

By HENRY S. GRAVES

Dean, Yale School of Forestry

Forestry endeavor of the past has largely been absorbed in initiating new enterprises, changing individual and public attitudes, acquiring knowledge and experience, and removing obstacles, economic and otherwise. It has made extraordinary progress. Foresters now have broader conceptions of their functions and responsibilities and their activities comprehend a much larger field than formerly. In looking ahead the author, a pioneer and still a leader in forestry thought and practice, predicts a material expansion of public forestry forced by the problems of the conservation of waters, the tremendous sweep of the recreation movement, improved fire protection, and the present wasteful liquidation of a basic natural resource. Both in public and private forestry there will be an increasingly exacting demand upon the profession for technical knowledge and proficiency. His paper is a philosophical survey of the past and a searching estimate of the future.

PROGRESS in forestry can be measured only by decades or other considerable periods of time. The forest is a product of natural forces operating through many years. It may take a long time for the effects of abuse to be clearly manifest. In like manner forest rehabilitation is a slow process. The very character of the problem of forestry requires us to look ahead and to plan far into the future, conscious that the actual results of our efforts at a given time may not come to full fruition until some distant period. In judging the progress of forestry it is necessary to bear in mind that a considerable part of our endeavor so far has been absorbed in initiating new enterprises, changing individual and public attitudes, acquiring knowledge and experience, and removing obstacles, economic and otherwise, which stand in the way of progress. We have been engaged in changing the point of view of a nation. This has involved the enlightenment of the public in regard to the significance and need of conservation, the removal of prejudices based on long tradition, the presentation of concrete measures that are feasible in practice, and the demonstration of the soundness of our proposals. We have had the task not only of persuading the public that forestry in a broad sense is desirable, but of winning an affirmative support which expresses itself in legislative measures and appropriations of money. Equally important has been the problem of demonstrating to the owners of forest land that their interests require the handling of their properties in a way to perpetuate the forest. Public education of a fundamental character of this kind inevitably proceeds slowly. It is natural that at any given time the practical accomplishments seem meagre. When, however, we contrast the present conditions with those prevailing at the beginning of the century, we perceive that in reality we have been advancing toward our goal with extraordinary rapidity.

There was a time, which many of us vividly recall, when there was no profession of forestry and, excepting sporadic efforts, no real practice of for-

[1]Presented at the 30th annual meeting of the Society of American Foresters at Washington, D. C., December 29-31, 1930.

estry in the country. We have reached our present stage of achievement because the small group of pioneers were able to look ahead confident in the soundness of the enterprise which they were promoting. It is certainly a great inspiration in recollection of those days to see at this gathering a representation of a profession well established and engaged in a great variety of forestry activities in all parts of the country.

It is possible in studying the history of economic and social movements to recognize certain distinctive periods or epochs representing successive stages of progress. Sufficient time has elapsed to enable us to indicate the milestones of advance of the forestry movement and to forecast the probable stages which one by one must be passed in the attainment of our ultimate objectives. We may point to work of the pioneers prior to about 1900 as the preparatory period, in which the efforts were primarily of the nature of exploration and laying the foundations of public knowledge of the existence of a forestry problem. Then follows the second period in which the obligations of the public in forestry are recognized; national, state and other public forests are established; and other activities such as organized fire protection, reform of taxation, and work in research and education are carried forward. The third period is marked by the initiation on a substantial scale of forestry on private lands; and the fourth or final period represents the maturing of the whole enterprise, with the stabilizing of economic conditions which permit a progressive intensification of forestry practice. In this country we are still in the second period, with many hopeful indications here and there of emerging into the period of bringing forestry into practice on private lands.

Inevitably these periods overlap and chronologically the transition from one to the next varies in different regions in a country so large and with such widely diversified conditions as the United States. The line of forward movement is irregular, with an advance in some sections far beyond the main front. We may count on the certainty that in the future as in the past there will be fluctuations in the rate of progress from year to year. Oftentimes a single legislative act, like the Weeks Act or the Clark-McNary Act, releases forces of great importance to the movement. A single state emerges from its apparent indifference and adopts measures which stimulate activities in forestry beyond all expectations. In every instance such steps are the result of a long period of hard work and determined efforts by some group of far sighted foresters, who have been exploring the field, discovering the facts of the problems, and educating the people to the need of action.

At the present time powerful adverse factors appear to retard our efforts in forestry. We are encountering economic obstacles which greatly embarrass our endeavors in the application of forestry on the ground. Over-production of lumber, competition of substitutes for wood, business depression with the curtailment of markets, low prices, financial tension in carrying on individual enterprises, and a general situation which may necessitate conservatism in public forestry, and various other circumstances, place a heavy burden on all interests directly or indirectly concerned with forests. Many of our diffi-

culties are due to conditions long existent which are now making themselves felt. In a sense we have moved up to them and have reached the point where they must be squarely faced and resolved. Sometimes the occurrence of serious difficulties proves in the long run to be a benefit, because they offer the occasion for concentrated effort to meet them. The removal of obstacles in the path of progress is not a question of their magnitude and weight but of the power of the forces which may be brought to bear upon them. This applies to the much discussed problem of over-production of lumber, to the problems of forest taxation, fire prevention, marketing of second growth timber in the East, and a multitude of other matters which are baffling us. They are a challenge to the intelligence, skill, technical ability, and political competence of our people and especially to the proficiency of our own profession. The confident determination of foresters and others interested in forests to meet these problems is to my mind the most encouraging and significant circumstance of present-day forestry. It augurs well for the immediate future of our undertaking.

One of the striking features of the evolution of the profession of forestry has been the broadening of the conception of our functions and responsibilities. I doubt whether those who framed the law of June 4, 1897 for the administration of the federal forest reserves had any conception of the many services that would be rendered by these public properties in addition to watershed protection and timber production. Yet there have developed scores of such services which are of vital economic and industrial significance. The task of forestry is to obtain from the natural resources in our charge all the values, utilities, and human benefits that are inherent in them. We are engaged in an immense economic undertaking. The resources themselves are varied in character. Their proper handling concerns many industries, is intricately related to the development of local communities, and affects the general public welfare in manifold ways. All the varied problems involved in securing the highest permanent service of the forest fall within our interests. We cannot escape them, if we would. Grazing, recreation, wild life conservation, articulation of forestry with agriculture, and water conservation and development are all our problems, as well as those relating directly to growing and utilizing trees. And in handling the forest resources our task does not end with the cutting and replacement of the timber. Our interests extend to the manufacture, distribution and final utilization of the material produced. We are concerned with industrial processes, industrial economics, and uses of the forest products in the arts, because these are an essential feature of the service derived from forests.

There was a time when some of the activities and occupations above mentioned were regarded as rather outside the sphere of forestry. Even now the question is often agitated whether a graduate forester who is employed by a lumber company in work connected with the manufacture and distribution of products is still one of the elect and worthy of continued recognition as a forester. It is my impression that some of these men may soon be in a position,

on account of their experience and contacts, to aid in developing industrial forestry on a large scale and setting forestry ahead more effectively than many other foresters who have been engaged in work more peculiarly connected with the growing of trees. I certainly hope that we shall not look askance at those trained foresters who at the moment are building roads, making maps, supervising accounting, or doing other work that might be performed by someone who does not possess the special knowledge of the science of forestry.

During the first decade of the century the majority of graduate foresters were engaged in public or quasi-public work. Since then the field of employment has been greatly widened. Information secured by the Forest Education Inquiry indicates that about sixty-five per cent of the graduates of forest schools have continued in activities directly or indirectly concerned with forestry. This compares favorably with other professions. The reasons given by men for leaving the profession are of course varied and often purely personal in character. A better financial opportunity elsewhere, failure to obtain a good foothold in the profession soon after graduation, dislike of local living conditions, dislike of the work, failure to get ahead in responsibility in a given organization, family obligation to live in a specific region or place, are among the typical reasons why men leave forestry. In a great many cases the men have formed contacts in their forestry work which have opened opportunities in business for which their education and experience have specially qualified them. This is true of men going into agriculture, horticulture, and general land and grazing enterprises; and one finds men in engineering, general teaching, banking, and a great variety of business ventures.

One of the first tasks of the Forest Education Inquiry has been to study the occupations in which foresters are engaged. Our primary object was to determine the educational experiences best calculated to prepare men for the various occupations, keeping in mind both present conditions and those which will develop in the near future. One is impressed first by the enlargement of the field of employment outside the federal service the last two decades. In 1910 a large proportion of the graduate foresters were employed by the Government. Today only about one-third are in federal service in the United States. The expansion of public and quasi-public activities outside the central government has been a very significant feature of the recent developments in forestry. The state governments now employ 11.1 per cent of the graduate foresters; 3 per cent are in county and municipal employ; 1.2 per cent in public service in foreign countries; 12.2 per cent are attached to educational institutions; 1.7 per cent are in association work of a quasi-public character. Thus 63 per cent of graduates of forest schools are employed in public service and education. Of the balance 2.1 per cent are in private work of an independent character, 29.2 per cent are employed on private forests or associated with the forest industries, and the balance are in miscellaneous enterprises.

It is possible to distinguish twenty-five or more activities or types of occu-

pations in which foresters are engaged. Many of them represent special phases of management of forests or of industrial undertakings. On the basis of the broader groups of activities, 7.9 per cent of the graduate foresters are engaged primarily in general administrative work chiefly in public service, 19.3 per cent in the management of public and private forests, 18.7 per cent in education and research, 5.5 per cent in appraisal, purchase and sale of forest lands, 5.3 per cent in organized fire protection, 17.5 per cent in logging manufacture and merchandising of forest products, and 4 per cent in arboriculture and municipal forestry. The remaining 21.8 per cent comprise recreation and park management, wild life activities, consulting forestry, range management, nursery practice, forest engineering, purchase of wood products, wood seasoning, wood preservation, association work, forest extension, advanced study at post-graduate schools, and scattered miscellaneous undertakings. There will doubtless be a tendency to a constant subdivision of the foregoing types of occupations as men become expert in some one or another phase of the work, and there will be a call for specialists who have had a training and experience qualifying them for specific undertakings.

During the past five years or so there has not been any substantial increase in the type of occupation. This is significant as an indication that we are in a position to define more clearly than heretofore the scope of the professional work in forestry. The character of the problems in the several occupations gives to the educator the clue to the preparation that is essential in training men to meet them. While the types of forestry occupations may not increase much in number, there will inevitably be changes in emphasis upon some of them and there will be a shifting in the proportionate number of men engaged in each. We have heard today from the previous speakers of the needs and opportunities in the fields of recreation, of wild life, of various phases of industry, and every student of the problems of forestry in the country can point to many other fields that are little developed and in fact scarcely explored. Some of these will be forwarded through public undertakings and some through private initiative.

I look to a very material expansion of public forestry within the next ten years. Numerous factors seem to me to justify this prediction. First of all there are several problems of capital importance which, I believe, will soon force a demand for public action. Several examples will suffice to make my point. Thus the reversion of land for tax delinquency in many sections of the country, which promises to reach large proportions, is presenting to the states and counties unforeseen and very acute problems of land utilization and public finance. Forestry under public action will play an important part in meeting the situation. Thousands of local communities will be obliged to come to grips with a forestry problem which touches the basis of their industrial prosperity. The effect of this circumstance on the forestry undertaking as a whole is difficult to foretell. Certainly it will be very far reaching.

A second problem is that of conserving waters and controlling their flow,

which is assuming such proportions in various parts of the country that we may expect a new challenge from the public to show what contribution forestry can make in preventing water wastage and other injuries. Many sections of the East are beginning to realize that they have a water problem which soon may be comparable to that of the West. The great increase in the use of water for domestic purposes as well as for manufacture in and near centers of population of the Northeast already indicates that every drop of available water will soon be needed. The widespread erosion in many parts of the country, the recurrent torrents and floods, such droughts as that of this year and last are dramatic reminders of the need of using every possible instrumentality in regulating the run-off of the water. We shall hear in the near future a great deal more about the relation of forests to waters and of public protection forests than in recent years.

A third circumstance is the growing appreciation of the public loss caused by the present wasteful liquidation of some of our basic natural resources under the uneconomic conditions of the industries engaged in their exploitation. The situation in regard to oil, natural gas, soft coal and lumber has repeatedly been brought before the country and the industries have made an appeal for sympathetic coöperation in correcting a condition that cannot but result in large public injury. We are concerned as foresters chiefly with the problem of lumber. Personally I believe that public action is essential to ameliorate the present situation. Whatever form such action may take it will introduce new elements affecting both public and private activities in forestry.

Still another feature touching public forestry is the tremendous sweep of the forces behind the recreation movement. Recreation has passed beyond the realm of sentiment and is assuming economic proportions of large magnitude. In forestry it provides a demand for well-handled public reservations and it introduces many new and important factors in their management. It does much more, for it opens avenues of transportation and in many sections it is a vital factor in making economic forestry possible.

Further, I anticipate that there will be a new step forward in the near future in fire protection. A superficial examination of the aggregate figures in the national statistical tables does not reveal what is really being accomplished. Experience and research are showing how the fire evil may be controlled in practice. This is being demonstrated where sufficient means have been afforded to those in charge of the protective work. Failures have been largely due to the inadequacy of funds for equipment, for improvements, and for organized man power. The demand by the public for better fire prevention will increase. Doubtless the demand will in some cases be expressed as criticism of the forest officers of the Government and the states, when the chief fault lies with the public for not granting sufficient means. We are reaching the point where it is possible to point out precisely what is needed to make forest property relatively secure from fire. The effect upon forestry of this next step will be tremendous. Definite pro-

grams of need, expressed in number of trucks and other articles of fire equipment, miles of roads and trails, and other improvements, and number of men at specified points, with clear statements of the results which we can now predict, will serve as a powerful challenge to the public for adequate support.

The next few years are likely to determine how far private and corporate enterprise is competent and willing, under the conditions and policies now governing their activities, to handle constructively the forest resources for which they are responsible. Meantime some progress in private forestry is being made. A considerable number of owners and operators are undertaking some measures to perpetuate their forests in addition to general coöperation in fire prevention. Though the aggregate area of lands under such management is still small in proportion to the total area privately owned, the beginnings are significant in opening the way for further developments. There is undoubtedly an increasing dissatisfaction on the part of the general public with the slow progress of private forestry. This is not due to mere propaganda for public restrictions on exploitation. It is an inevitable demand that accompanies the increased interest in forests and their benefits, the appreciation of the consequences of destructive processes in the forest, and the pressure for the appropriation of public funds to restore and rehabilitate forests as well as to give added security to forest property, to make concessions in taxation, and to acquire public forests. We cannot escape the problem if we would, unless private owners assume the responsibility of a better handling of the forests in their possession without public pressure; and the assurance of this eventuality in the near future has not yet been indicated.

One of the most potent forces behind this movement of private forestry is the profession itself, with men studying the problems underlying successful practice and accumulating experience that is equipping them to direct the work on individual properties. Aside from any influences that may accrue from public forest activities, the progress of private forestry is pretty largely dependent on the competence of the foresters in handling this aspect of applied forestry. As an educator I am interested in this problem, for the schools have the task of building up a body of men who will possess the knowledge, ingenuity, skill, and persistence essential to open up and develop the field of private forestry.

When one undertakes to look ahead in the study of the problems which in the certain progress of events we must face and solve, it is appropriate also to scrutinize the development of the profession of forestry and to envisage its potential leadership to carry forward the movement. Here is a body of men engaged in a common undertaking, with a background of technical training, with a common objective of great importance to the nation, and organized through technical societies and other means for the advancement of the forestry movement. The profession is characterized by a peculiar solidarity, high standards of service, enthusiasm and vitality. It may be justly proud of its record. It is well, however, to examine ourselves occasionally through the eyes of those out-

side of our immediate circle. I think that all of us like to look upon forestry as comparable with other learned professions, such as engineering, law, medicine, and others. Yet we must acknowledge that as yet we have not established that position in the estimation of many of our colleagues in other professional branches. Some do not regard forestry as a clearly defined profession but rather as an aggregation of occupations. They regard forestry, not as a distinctive science, but as a collection of fragments of knowledge taken from the natural sciences, agriculture, engineering, economics, and lumbering, and applied to the practical problems of utilization of forest land and its products. It is said by some that the average forester is not called upon to exercise the same creative powers and technical skill as the engineer, lawyer, and surgeon, and that the preparation for the profession is not as exacting on the scholastic side as for the other branches of learning. It is pointed out that a great deal of the work which foresters are carrying on does not require a professional training, and that many men occupying important posts have little or no background of a scientific or technical character. Some special knowledge of forestry may be desirable but, it is said, many of the procedures in handling forest matters may be acquired through a short vocational training or at the most a semi-professional education. Hence it is that some do not recognize forestry as a profession of the first rank.

The explanation of the existence of such views lies first of all in the fact that we are still in the creative stage of building up the science and art of forestry in this country. It is true that many of the routine procedures in managing forests can be performed by men with a brief vocational rather than a full professional training, and this will always be true just as is the case in civil engineering and other branches of applied knowledge. The character of the work of the professional forester should not be judged by some phase of woods practice but rather by the problems of those who are doing the creative work of organizing and directing forestry enterprises. We need in forestry many men of varied training and experience, but there must be those who have the ability and educational background to enable them to explore and analyze the problems of forestry, to search the causes of the economic and other obstacles encountered, to conduct scientific and economic research, to devise and direct public action in forestry, to work out the perplexing problems of private forestry, to organize and direct the work of forest practice on the ground, and to perform the many other functions that call for special knowledge and skill. The foresters are the architects of a great scientific and economic structure, not alone the draftsmen and artisans. The problems with which we must deal call for men of the first rank in intellectual power and personal qualifications and an education that in quality measures up to that of other comparable professional branches.

The happiest circumstance is that many men are achieving eminence for their professional attainments, winning recognition as administrators, as technical experts, as educators, as productive scholars. The distinctive place

occupied by a given profession depends on the character of work performed by its members. It is well to keep in mind that forestry is a progressive undertaking. Pioneer work always seems crude in light of later developments. We must begin with the materials at hand and with the economic conditions which confront us. Oftentimes the first work of organization of a forestry enterprise may seem so elementary as to require little technical knowledge. This is by no means the case if the work is undertaken as a step in a progressive plan of development. The field officer in charge of the forests of a portion of a state, or a ranger district, or of a private forest has the opportunity by his studies of local industrial, economic and social conditions to determine the measures that one by one must be adopted to place the undertaking on a plane of more effective service. Progress will depend not alone upon his efficient performance of daily routine but upon the application of scientific knowledge, skill and ingenuity in discovering ways to advance the application of forestry. This work cannot be derogated to second place from a professional standpoint.

As I look to the future of our profession I am convinced that the work in all the branches of forestry will become increasingly exacting from the standpoint of technical knowledge and proficiency. The importance of sound education to prepare men for the tasks of ten, twenty, and thirty years hence cannot be over-estimated. We must recognize that there are serious deficiencies in our educational system, taking the forest schools as a whole, which must be corrected, if the foresters are to receive a sound professional education. In the confusion regarding the real educational requirements in forestry there has been heavy pressure upon the schools offering full professional training to adopt procedures which inevitably react to lower accepted educational standards, especially in foundational work. Most of the deficiencies in the forest schools can be overcome in the long run, though it will mean an increased burden, financial and otherwise, upon the institutions, which in some cases will be difficult to carry. The training for semi-professional work can be provided by other types of schools or otherwise; the need for such training should not be allowed to affect the educational standards of the professional institution. In any case I hope that there will be an insistence upon the part of the profession in no uncertain terms that standards of training be placed on a basis of unquestioned quality and effectiveness.

We are building not for today alone but for tomorrow. The profession already exerts an influence and power in the nation. Its opportunities are almost unmeasured. The future of forestry depends upon the younger men in the profession and those who will join our ranks from year to year. Let us in this generation lay firm foundations for their work and provide them with a power and understanding that will enable them to meet the changing conditions and new problems with courage, intelligence and skill. We can leave no greater heritage.

FORESTRY CONCEPTIONS AMONG TIMBERLAND OWNERS IN THE NORTHEAST SPRUCE REGION[1]

By ERNEST F. JONES

Forester, Great Northern Paper Company, Bangor, Maine

The author gives an informative account of the economic conditions and forest practices obtaining in the spruce region of the Northeast and points to the problems involved in the practice of forestry. The practicability of forestry in this region is strongly influenced by the uncertain future facing the pulp industry. Many owners have made studies and observations of the results of their methods of handling their timberlands. They give forestry methods a fair field by employing more technical foresters than are employed by private owners in other regions and they feel keenly the biased criticism of those outside the owner class.

Geography and Importance

The spruce region of the Northeast includes roughly the northern half of Maine, northern New Hampshire, Vermont, and the Adirondack region of New York.

In its silvicultural features the region is quite uniform. Industrially or economically the state of Maine portion to which this discussion particularly applies, is somewhat different in that the spruce is in a comparatively solid block back from the mills; the relation of local production to consumption is much more favorable in Maine than in New York. Estimates of the ratio of the annual pulpwood growth to consumption range from 50 per cent to 100 per cent.

The annual consumption can be determined to be in the neighborhood of 1.5 million cords, a quarter million cords of which is imported, leaving a demand of 1.25 million cords to be met by Maine lands. The net growth rate is quite generally accepted at 2 per cent. The amount of forest capital is estimated variously from 30 million to 60 million cords with annual production of from 600,000 to 1,200,000 cords.

Ownership

Another differing feature is the character of ownership. In Maine most of the spruce lands lie in a large unsettled wilderness, with no civil organization below the county, and are therefore technically called the "wild lands." These are held, first, by pulp companies in connection with paper mills; second, by large estates and land companies who hold lands as long-term investments with frequent periodic dividends.

One feature of ownership which perhaps is not favorable to the best management is the fractional undivided ownership system wherein there are no surveyed subdivisions of a block of land, but different owners possess an undivided fraction, as 1/3 or 10/396 for example. The interests of all parties may not coincide in the land management so that a small minority may block the wishes of the majority.

[1] Presented at 30th annual meeting, Society of American Foresters, at Washington, D. C., December 29-31, 1930.

Naturally the ownership most susceptible to systematic forest management lies with the concerns owning land, pulp mills and paper mills. Even the larger owners of timberlands not having mills are more or less restricted in sales opportunities by the regional or watershed activities of the large mill operators.

Condition of Paper Industry

The present condition and probable future trends of pulp-using industries obviously influence timberland management. Present basic features tending toward uncertainty are: 1. Many mills operating at little or no profit and some at a loss; 2. increasing competition with other regions; 3. chemical developments bringing other species into competition. All of these indicate lower present returns and render future markets for pulpwood uncertain. Co-incidently costs of carrying timberlands are steadily rising.

Present Forest Practice

INVENTORY

An inventory of their assets is secured by all classes of owners. While the accuracy of many of these timber inventories leaves something to be desired, it has been reasonably well in keeping with financial returns from such lands. Extensive checks of these estimates have been available since the legislature has appropriated large sums for cruising forest areas to secure a basis for assessment.

PROTECTION

The protection of these assets from fire and insect logically follows. The Maine Forestry District, which is the legislated entity handling this problem in the wild lands, was voluntarily sponsored by and is financed by timberland owners. The record of a 20-year period showing one-third of 1 per cent of its area burned each year is the measure of its efficiency.

Outside of the District there is the regular state organization and a coöperative protective association.

There is a permanently-employed state forest entomologist.

UTILIZATION

Inspection of all logging operations for waste is the universal practice. The pulp industry as an industry, in this section at least, offers the best example of close utilization among major timber species, with the unimportant exception of wood distillation. There can be no increase in the intensity of utilization now practiced until stumpage values rise. While no time-volume studies have been made it is recognized that some small wood is now taken from the operations that costs more than it sells for.

It must be borne in mind that we are dealing with a region and species where stands run only from 5 to 12 cords per acre, or less than the amount of material left on the ground in the form of waste by operations in the competing species of the Northwest.

Furthermore the idea of salvage of killed timber has been the dominant

consideration in most operations for the last ten years, because of the death caused by the budworm of from 25 per cent to 35 per cent of the pulpwood of the state.

CUTTING METHODS

Cutting to a diameter limit was the universal practice, and had been such for a generation until salvage became the main objective.

The diameter limit system has become discredited in many regions but local foresters quite generally agree that it has been and will be a valuable method until such time as the economics and silviculture of more refined methods are demonstrated.

There is no forest devastation through logging practice. Nearly pure spruce stands when cut clean restock the areas with absolute certainty.

Forest degeneration in some types is now occurring when cut to 6 inches d. b. h. It occurs in some types when cut to a diameter of 12 inches. As stated in a paper by Carlisle, about 25 per cent of this region is in softwood types, about 25 per cent in hardwood types, and the remaining 50 per cent in various mixtures.

Extensive regeneration studies carried on by various private owners and by the Northeastern Forest Experiment Station show that under the past operating practices successful restocking is assured on the softwood types. On the 25 per cent in hardwood types there is nothing that the forester could or should do to grow spruce. In the remaining 50 per cent these regeneration studies showed that an important fraction has been successfully stocked with spruce. Forest degeneration is, therefore, confined to, roughly, 25 per cent of the forested area. Here, then, lies that beatific "next step" in the forestry of this region.

SILVICULTURAL INVESTIGATIONS

The matter of annual wood production in terms of growth per cent has been given technical study by nearly all of the pulp concerns owning timberlands and by some of the strictly timberland owners.

The regeneration studies previously mentioned, carried on by trained foresters have not been undertaken by many different owners, but the general effect of past operations is a matter of almost universal concern, and many owners have experienced woodsmen who make capable observations of the conditions they are acquainted with.

Investment, as well as operating owners, have made experiments in the girdling of undesirable species for the benefit of the pulp species, and large-scale operations are in the plans of several concerns.

SILVICULTURAL MEASURES NOT IN PRACTICE

It is true that orthodox, ritualistic forestry is lacking in this region. There is no brush disposal in logging operations, little planting in cut-over lands, little use of the marking axe, few working plans with a sustained yield basis.

The Forest Service Technical Bulletin "Timber Growing and Logging Practice in the Northeast," states that "it is

doubtful whether universal slash disposal, with its high cost, can be regarded as an essential feature of adequate fire control." Most owners are certain it is not an essential nor an economic measure.

Planting has only a limited place, such as on abandoned farm lands, and certain kinds of burns. One company was presented with a definite problem in a 12,000-acre burn. The deductions from their 10-year old plantations on other burns were that planting as an investment was exceedingly dubious and that some sort of merchantable species would voluntarily come in anyway. On this large burn plots were marked representing different degrees of fire intensity and forest types. Observations on these plots in the last seven years have demonstrated that the planting of spruce would have been silviculturally unsuccessful on about 75 per cent of the area because of competing species. On the remainder a stand of poplar, white birch and lesser species is coming in to make soil cover and in many places produce a desirable forest.

The marking of timber to be cut is standard practice, I believe, in one concern only. But here, as everywhere commensurate financial returns of such investment will have to be demonstrated before the practice becomes general. Certainly the returns from timberland investments must be more promising than at present. This measure, however, promises to march along with girdling to point the direction of the "next step."

The "next step" has become as habitual in forestry parlance as "static" in radio. This situation infers that the procession has come to a halt. That the foresters in the woods are marking time until a new band strikes the correct note, or a new revelation shall be given. However, the last project list of the Northeastern Forest Experiment Station shows over 50 separate projects being carried on by 8 different manufacturing timberland owners. There are at least two other owners who are carrying on experiments to increase forest yield.

Ownership Obligations

The average owner of this region summarizes the situation about as follows:

1. Character and location of the property determines permanency of ownership.
2. Regional competition renders returns on long-term silvicultural investments highly uncertain.
3. There is no real forest devastation by logging, and present forest practice to a large degree assures the perpetuation of the desired species.
4. Utilization is close.
5. The best traditions and practices of forestry are being given a fair field through the employment of more trained foresters than in any other region of its size on this continent.

However, there is a widespread attitude of criticism of the management of forest holdings. Charges of gross materialism are made. Outside of the profession there are lay members with more or less intimate knowledge or observational opportunities combined with evangelical tendencies, who associate

with the ownership of this renewable resource—the forest—a kind of stewardship, and who judge this stewardship from an abstract moral standard, quite disassociated from the usual economic laws paramount in other property. A case in point is an article given wide newspaper and magazine publicity which, with purposeful bias, lamented the passing of Maine's "priceless wilderness heritage . . . . for a mess of pulpwood," into the possession of robber land barons. A king's ransom could never purchase equal publicity for the facts in the situation.

This summer a forestry magazine asked why millions of cords of limbs suitable for pulpwood were left in the woods while just such wood was being imported from Russia. There was the attitude of believing the worst without making the effort to find the truth, which is that for 15 years in common practice smaller and poorer wood has been taken from the Maine woods at any rate, than is coming from Russia. These are merely two instances out of many.

Managers of pulp concerns, agents of estates and timberlands owners have as high a sense of public responsibility as the average. At least two large concerns deemed it wise to protect themselves by hiring foresters from the best schools of the country for the specific purpose of obtaining the facts in fields where they, the owners, have been held up to public criticism. They suspected both the facts involved and the motives of the critics.

It is here submitted that it is to the outstanding credit of the officials of those concerns, and of the forestry profession, that those foresters have been given increasingly important positions in both research and executive responsibility.

So much for the moral-turpitude-surrender-of-principle idea.

In the April number of JOURNAL OF FORESTRY you will find diametrically opposite opinions expressed by a few articulate members on such basic matters as the following: national timber exhaustion, legislative forest regulation, sufficiency of silvicultural knowledge, trend of per capita consumption, oppressive taxation, culpability and moral turpitude of the profession.

Timberland owners cannot be supposed to be unaware of such a condition within the profession.

POSSIBLE DEVELOPMENTS

There are three possible developments from the present status of timberland management in this region.

1. Foresters and owners coöperating in normal economic procedure may continue the past practice of silvicultural investigation and economic analysis to the effect of securing faster growth and surer forest regeneration by stand improvement measures which will be profit-bearing investments.

2. Regional competition may force the price of pulpwood permanently below the cost of growing it (as it is now), in which case timberland owners will be forced to salvage what they can, and the mills will be scrapped.

3. Regulation by state or national legislation may come, the result whereof man knoweth not.

Let me quote from a technical paper

on this same forest region, published 31 years ago: "The man who would throw in his lot with the forests, who would economize in their use and maintain their growing power, must bring himself to bear on the forces in the field. . . . . Forestry should seek to ally itself with business, to promote the success of careful and foresighted concerns. The forester, if he would work directly on the problem of management, must work in private employ and in accordance with fundamental conditions. First among them is the necessity of making a profit. Should the forestry practiced lead to loss, the business goes down and the forester's position and opportunity go with it."

We dignify the practice of the physician by calling it the Science of Medicine, mindful, however, of its slow progress from its beginnings in black magic. Forestry has been too much an attitude of mind. It is now a highly diversified art. It will be in time a Science.

The length of that time will depend on the knowledge of silviculture, of economics, relations between the profession and the owners of their field of practice, and the relations of both to the public.

THE WHITE PINE BLISTER RUST SITUATION[1]

By S. B. DETWILER

Principal Pathologist, Bureau of Plant Industry, U. S. Department of Agriculture

The white pine blister rust is a plant immigrant that is in America to stay and bids fair to become one of our major forest enemies. Control measures are possible at costs which ordinarily make it profitable to continue commercial production of the five-needled pines, but waiting for the rust to strike in a new region may make its control unprofitable. In this paper the author, with many years of experience in active charge of blister rust studies, points out the gravity of the situation, calls attention to some important misconceptions, and gives precautions in establishing plantations.

THE purpose of this paper is to present to the foresters of the nation certain pertinent facts which they must realize and upon which they must act if they are to fulfill their obligations to forestry. In any part of the United States where white pine is now or should be in the future a component and valued part of the forest stand, white pine blister rust must be controlled or the serious losses which will result from the disease must be openly faced, and the responsibility taken by those who made or failed to make the decisions regarding control.

White pine blister rust has spread throughout the eastern white pine area from Maine westward to Minnesota, and southward to the Maryland line. In the West it extends throughout the western white pine range to within about 40 miles of the California line in southwest Oregon. The disease is now established on at least three-fourths of the area of the commercial five-needled pine forests of the United States.

Control of the rust in the northeastern states has been extended to approximately eight million acres of pine lands and continued commercial production of white pine in that region is assured if the present systematic protection is continued. Pennsylvania and the Lake States are making good progress in the development of the blister rust control practices, with every indication that the work will succeed.

The outstanding development at present is in the western white pine region. Here the disease is so well established and is intensifying so rapidly that between 1935 and 1940 we must expect the entire white pine belt of the Inland Empire to be generally infected unless control is extensively applied in the interval. Already the action of the rust in this regian shows that mature stands as well as young pine growth will be destroyed rapidly if the currants and gooseberries (*Ribes spp.*) remain in these forests. Extensive experimental work conducted in the West since 1922 by the Bureau of Plant Industry in coöperation with state and private agencies demonstrates that these bushes, the alternate host plants of the rust, can be destroyed cheaply and effectively by the same general methods as have proved successful in controlling the rust in the East. Destruction of Ribes by

[1]Presented at the 30th annual meeting of the Society of American Foresters at Washington, D. C., December 29-31, 1930.

means of chemical sprays has been found highly effective and less expensive than pulling the bushes by hand on sites where these plants are very numerous.

The forestry officials and white pine owners of the Inland Empire are now aware of the danger and are organizing to apply rust control on a large scale. However, there are financial limitations on the acreage which can be cleared of Ribes within a brief period of years and there is also limitation on the trained personnel available to lead the work. If control work fails to keep pace with the intensification of the rust, it must result in a forest calamity comparable in magnitude to the chestnut blight disaster. The best of the western white pine sites aggregate over 3 million acres. It is a sizeable task to clear this land of Ribes within the next ten years. At least a million acres of young white pine on cutover lands in private ownership probably will be destroyed by the rust unless the federal government acquires these lands, or extends adequate help to the present owners as an emergency measure. The land bears excellent stands of western white pine, mostly under 40 years of age, and represents the very cream of the pine sites. Under protection from rust and fire this land would eventually produce from 15 to 18 billion board feet of white pine timber. This forest land must be kept productive. Without the federal government assuming the bulk of the protective costs it will not be kept productive. What greater folly could there be than the federal government practicing forestry upon the adjacent lands (which in many cases are less favorable for forest production), and neglecting this cream of the forest land which must ultimately revert to the State or federal government because the present owners cannot afford to carry it longer? The government already has a great responsibility in this region since it owns over one-half of the white pine lands of the region. The incentive to control efforts is that western white pine represents approximately 75 per cent of the value of the forest products consumed within and shipped from the Inland Empire region. Huge present and future values are at stake.

Foresters who have not followed the blister rust situation closely are apt to have a somewhat hazy conception of the essential facts concerning the disease and its control. Many look upon the rust as a disease which is destructive only to young pine. The rust kills mature trees with the same deadly certainty as immature ones; this is an especially important consideration in the West. Others think of the rust as being so slow in action as to constitute no serious menace whatever. The rust has worked rather slowly in parts of the East because there are fewer wild Ribes in the average eastern pine forest. This has permitted initial control operations to be extended over a period of 15 years. Stands where protection was delayed have been so severely damaged that even the most skeptical have but to see them to be convinced that the blister rust is a major forest enemy.

The species of white pines vary widely with respect to their readiness in becoming infected with the rust; likewise the susceptibility of the Ribes to infection varies with their species. *Pinus*

strobus is resistant to blister rust damage compared to *P. monticola* and *P. lambertiana; P. albicaulis* and *P. flexilis* are highly susceptible. Certain species of wild Ribes in the western white pine forests closely approximate the European black currant in power to damage the pines and wherever such species occur in great concentration of leafage, white pines of all sizes will suffer heavy damage to a considerable distance from such concentration. Nearby pines exposed to infection of this character develop rust cankers on practically every twig on the trees. Death of the cankered twigs takes place five to seven years after infection occurs, hence if all the twigs on the tree are diseased, the tree dies rapidly regardless of its size.

Most foresters are aware that destruction of the Ribes bushes within and adjacent to a pine stand protects that stand from infection by the rust. But few realize that the disease enters a pine through its needles and that the first readily visible signs of infection appear only three years or more after the tree is infected. We must always wait several years to learn the full extent of pine damage after the trees are exposed to infected Ribes. This insidious character of the rust plainly calls for eradication of the Ribes before they become diseased. However, it is human nature to delay action until the last possible moment and with the rust this means that severe infection often occurs before those responsible for the care of the pine are aware of it.

Foresters as well as others are frequently guilty of planting white pine in infected regions without eradicating Ribes from the planting sites prior to planting. This work is put off until later, or not recognized as necessary. Too often this policy results in severe loss from blister rust. Others are deterred from planting white pine because they fear damage from the rust. If white pine is the species best adapted to the site, the sensible thing to do is to ascertain the cost of rust protection and let this determine whether white pine or some other species is most profitable to plant. Foresters should give close attention to selection of planting sites adapted to the planting of particular species and in the case of white pine this includes selecting sites where Ribes eradication costs will not be excessive. Protection of white pine nurseries from the rust is another essential precaution which foresters and nurserymen frequently neglect.

Another misconception is that if the rust destroys the present natural stands of five-needled pine, these species can still be produced in commercial quantities through extensive planting after Ribes are eradicated from the planting sites. It is true that this could be done and in the future white pine will be extensively planted in the United States for the reason that it will be highly profitable as a crop on idle lands. Canadian stands of white pine represent approximately one-fifth of the present American supply and the Canadians have made no serious attempt to control blister rust. This must result in greatly reducing the future supply of the species and will tend to stimulate white pine production in the United States because of the advantage we have already gained through our control efforts. However, I believe it unlikely that forest planting

of any species will be done within the next one hundred years on an acreage equal to our present stands of naturally seeded white pine. Furthermore, it would not relieve us of the necessity for eradicating Ribes nor reduce the cost of blister rust control if white pines are planted on these lands. Control operations will cost no more now than then. In addition, this procedure would entail the loss of the present partially matured white pine growth and protection of these stands is essential to continuous commercial production of the species.

Today we have a rich heritage in millions of acres of first class white and sugar pine forests. From the forester's viewpoint the ability to secure natural regeneration of white pine on these lands is of paramount importance. This will be lost unless blister rust control is extensively applied without delay. It is the duty of the control experts to call attention to the present emergency and to assist in applying and maintaining blister rust control. It is the forester's duty to fully acquaint himself with the facts and take timely action. Those responsible for safeguarding our forest wealth must make the decision as to where and when blister rust control work shall be done. Blister rust control is a phase of forest protection and leadership in forest protection is the duty of the forest manager.

The time to consider this matter is while the opportunity to save existing stands remains. If thorough consideration of the essential facts indicates that the present or future white pine values in any particular area do not justify the cost of protection, it then gives time to work out systematic plans for replacing the pines in the stand when the need arises. If the decision favors protection of the pines, prompt action enables adequate plans to be developed and control to be applied systematically in time to prevent severe damage. It is my hope that those concerned with five-needled pine production in California and Oregon will be warned by the emergency now confronting foresters and lumbermen in the Inland Empire, and will do their utmost to establish control conditions as soon as possible in pine stands before they become heavily infected, which is most certainly bound to happen if no control measures are instituted. Similarly, foresters in the Southern Appalachians and the Ohio valley should no longer delay development of a blister rust control policy and plans.

The gist of the matter is this: White pine blister rust is a foreign disease that is in America to stay. It is readily controlled at costs which ordinarily make it profitable to continue commercial production of the five-needled pines. Procrastination in applying control means that the disease will creep in and cause preventable losses; procrastination may result in losing our present ability to secure excellent natural regeneration of the white pines. Those responsible for managing forest tracts should determine the white pine values on the lands in their care. They should also ascertain Ribes conditions on these lands to find out if the cost of protecting the pine is warranted. If rust control will pay, this work should be undertaken promptly and thoroughly. If the facts do not warrant the application of control there will then be no grounds

for charging gross negligence against those responsible for forest production.

Sound decisions on blister rust control depend on knowledge of control methods and costs. This can be acquired through the aid of control experts. However, since those engaged in managing white pine forests must deal with blister rust for a long time to come, they will profit by gaining first-hand knowledge of the essential facts through inspection of actual control operations. The nature of the disease and the methods of control are readily understood when seen in the field. When the facts are thoroughly understood by those responsible for forest management, it is not a difficult matter to coördinate blister rust protection with other forest protection routine. In order to save our valuable white pine forests, it is absolutely necessary to make blister rust control as systematic and regular a protection practice as is fire protection. Failure to do this must result in the loss of a national forestry resource of incalculable value.

CHEMICAL UTILIZATION OF WOOD WASTE[1]

By L. F. HAWLEY

Principal Chemist, U. S. Forest Products Laboratory[2]

Although there are very large amounts of wood waste, yet forestry is not unique in its waste problems; farming and mining have wastes as great or greater in proportion to the main products. Because of the large supplies of wood waste in comparison with the markets for chemicals it is not likely that successful chemical utilization of wood waste will considerably increase the sales value of the waste. This situation is, however, favorable for future utilization developments since it assures the chemical manufacturer a cheap and plentiful supply of raw material.

BEFORE this audience it is not necessary to discuss the amount of wood waste available for utilization. It is common knowledge that wood wastes are large, not only in aggregate but in proportion to the wood utilized; it is the common and correct opinion that it is very desirable to utilize as much as possible of this waste by present methods of recognized utility and that it is even desirable to make great efforts to develop new methods of utilization. It is possible, however, that we have heard wood waste discussed and deplored so much that we have lost our sense of proportion and have come to think that forestry is unique in its waste production. In order to get a proper perspective on wood waste, it is necessary to compare it with other industrial and agricultural wastes.

The miner leaves in the ground ore that will not pay for mining, he brings in to the smelter and does not utilize a large proportion of gangue, and he leaves in his tailings whatever metal that can not be recovered at a profit. As a single concrete example, the copper miners have brought to the smelter ores that contained less than 1.5 per cent copper and have wasted the other 98.5 per cent without any qualms of conscience and without any criticism from mining engineers or economists. In fact, they have been praised for developing the mining and smelting methods that made possible the handling and discarding of so much waste with a profit on the whole operation.

Many of the agriculturist's crops consist largely of stems, stalks, or leaves that are either not harvested or are harvested and not utilized. The miller of certain grains separates hulls that he does not utilize. As a concrete example, the corn farmer grows a crop of which about 60 per cent is waste and 40 per cent grain, a ratio of waste to product only a little lower than that usually ascribed to lumbering operations.

In order to make these comparisons convincing it is necessary to foresee and meet the obvious criticism that will be raised against them. The foreseen criticism is that the miner does not waste his *metal* and the farmer does not waste

[1] Presented at 30th annual meeting, Society of American Foresters, at Washington, D. C., Dec. 29-31, 1930.

[2] Maintained at Madison, Wis., in coöperation with the University of Wisconsin.

his *grain,* but the lumberman does waste his *wood;* that the miner's and farmer's important wastes are only *by-products* while the lumberman's largest wastes are in his *product* and that therefore the comparisons are not permissible.

It must, however, be kept in mind that, although the lumberman's product is sometimes considered to be the substance wood, yet the value of this product is still largely controlled by the sizes and forms that can be profitably cut from the sizes and forms in which it naturally occurs. Under manufacturing conditions of this kind the by-products of the industry may be of the same *substance* as the product. It seems permissible, therefore, to compare the by-products of mining and agriculture, which are different in *substance* from the products, with the by-products of lumbering, which are different only in *form* from the main products.

It is hoped that this very brief and general comparison of wood waste with other wastes has indicated that the lumber industry is not uniquely culpable in its wastefulness. The previous discussion also shows that the forester has a certain advantage in his attempts to develop methods for waste utilization. Since the waste is largely composed of wood, the same as the product, any research on the fundamental properties of wood, planned to give information of value in connection with more efficient utilization of the product, also gives information of value in the development of new methods for the utilization of the by-products. In other words the wood technologist does not have to go out of his own field to study wood waste utilization, while the corn technologist must enter a new field to study cornstalk utilization.

There is still another point of view for wood waste that is more charitable than the usual one. In most estimates of the amount of mill waste, everything brought to the mill and not sold is considered waste. The facts of the case are that probably 60 per cent of the wood usually classified as mill waste is used as fuel by the power plant at the sawmill, or by the mill employees. Such fuelwood is not a direct source of income but the wood is certainly not wasted and instead should be considered an example of proper waste utilization. Many sawmills also sell fuelwood but even this wood, which brings direct income, is usually classed as waste. Not only in comparison with other wastes but in actual proportion of wood harvested there is less wastage of wood than is commonly believed.

The subject of wood waste utilization is so complicated that it is impossible to generalize without becoming inaccurate. In order to reduce the complications it is desirable to limit this discussion to chemical utilization and even to exclude from chemical utilization certain processes that are commonly and perhaps properly considered chemical. In chemical utilization are usually included all processes in which the wood is treated chemically even though the product may owe its value to fibrous or structural properties rather than to chemical properties. This discussion, however, will be limited arbitrarily to those processes that produce chemicals from wood and will therefore exclude the very important pulp, paper, and fiber board products.

Present Status of Chemical Utilization

The present status of the chemical utilization of wood waste is not encouraging. Three processes in commercial operation within the last 15 years using wood as a raw material for oxalic acid, ethyl alcohol, and galactan, respectively, are no longer in operation. Hardwood distillation has been declining for several years on account of competition with new synthetic and fermentation processes that make its principal chemical products, acetic acid, acetone, and methanol. The production of tanning extracts from wood and bark is about stationary, but chestnut is the main species used for this purpose and soon there will be no more chestnut to utilize. There is, however, one promising development so far as present methods are concerned—the chemical use of wood cellulose is expanding. Specially purified wood cellulose has competed successfully with cotton cellulose as a raw material for making viscose rayon. Its use may expand in this field and there is a possibility that it may even enter the field of other rayons and of other chemical cellulose products.

Except for the further development of this one promising existent process, future progress in chemical utilization will apparently depend largely on new processes. For this reason there is little basis for a discussion of what the future processes are likely to be or what waste or how much waste is likely to be utilized and such a discussion will not be attempted. There is, however, sufficient basis for a pertinent discussion of the direct and indirect values that may be given to wood waste by chemical utilization and of the effect that the costs and supplies of wood waste may have on developing successful utilization processes.

Effect of Utilization on Value of Waste

It is a common impression that a successful chemical method for wood waste utilization would necessarily give a value to the waste commensurate with the profit on the process. Except under certain unusual conditions, however, such an increase in value would not follow. If the owner of the waste also owns and operates the utilization process, he can charge himself as much as he wants for the waste up to the limit of the profit in the process, or he can figure all his profits on the process and charge off the waste at the cost of handling. If the owner of the waste does not own the process he must take what he can get for his waste in competition with other wood waste producers and this will probably be little more than the cost of handling. The old law of supply and demand rules here and unless the demands of the utilization process (or indirectly, the demands for the products of the utilization process) are greater than the supply of waste suitable for the process the value of the waste to its owners is not materially increased.

There is a well-known example of chemical waste utilization that confirms and elaborates this conclusion. We have heard many times how coal tar, that black, sticky, evil-smelling by-product of the gas industry, through chemical research became the foundation of a new

branch of chemistry and the chief raw material for several new industries in which it is transformed into dyes, perfumes, medicinals, explosives, and other important and high-priced products. This is indeed a beautiful picture and an accurate one. By implication, however, an inaccuracy has crept into the picture; it is commonly implied that these wonderful developments have redounded to the great profit of the producers of coal tar. In order to discuss what has actually happened to coal tar from the point of view of the producer, it is necessary to distinguish two fractions of the crude tar, the light oils and the tar proper, because there are differences in the way they are utilized. The light oils, which make up only a small part of the total tar, are pretty completely utilized but only a part of them are used in making the high-priced chemicals. Most of them are used as motor fuel or solvent, and the price is therefore controlled by competition with other similar fuels and solvents—not by their chemical uses. The main fraction of the crude tar, the tar proper, is only about two-thirds utilized, the rest of it being used as fuel at the plant. The use of coal tar as a raw material for making high-priced chemicals has therefore been without effect on its value; the value is controlled by the low-priced uses. One small fraction of the tar is largely utilized and its value has been raised accordingly, but the main part of the tar still has a value only very slightly above its fuel value.

One reason for limiting this paper to those types of "chemical" utilization in which the *products* are chemicals now becomes evident. The markets for chemicals are likely to be very restricted in comparison with the markets for structural materials, such as paper and fiber boards, and conclusions based on probable extent of the markets do not apply with equal validity to both types of utilization. For applying the "supply-and-demand" principle to wood waste, let us assume that a successful commercial method is developed for making dyes from wood and that the dyes so made replace 30 per cent of artificial dyes previously made by other processes. Approximately 1,000,000 pounds of artificial dyes were made in this country in 1929; we may therefore assume a demand for 300,000 pounds of wood dyes. If the dyes were produced with a yield of 10 per cent of the wood used, 3,000,000 pounds or 1,500 tons of wood per year would be required. This amount is certainly not great enough to have any appreciable effect on the value of wood waste.

It is not meant to imply from these examples that *all* wood waste must be utilized before the value of any of it is materially increased, but only that all the waste equally suitable for a given process must be utilized. Wood waste is variable in the conditions affecting its suitability for chemical utilization so that certain wastes might command a fairly high price without coming into competition with other waste. The variability may be in chemical composition, in form, or in the supply available without transportation. For instance, beech, birch, maple, and oak, on account of their chemical composition, are especially suitable for hardwood distillation and have never suffered serious competition from other species. In this same

waste utilization process the larger forms of waste have been used without serious competition from the smaller forms of waste, even though the latter could be obtained more cheaply. The effect of the available supply on suitability is exemplified by the process for making ethyl alcohol from wood. During the brief period of the commercial operation of this process it was only the largest sawmills that could furnish sufficient mill waste for successful operation.

These examples show that the variability in requirements of different processes may make possible the utilization of various types of waste without competition between types. This discussion of suitability variation also indicates that the utilization methods most likely to add considerably to the value of the waste utilized are those for which only narrowly limited types of waste are suitable.

Cost of Waste

It is not customary to discuss costs of waste because waste is commonly considered to be available for utilization without cost. Of course, costs of collection are sometimes discussed and they are especially significant in connection with wood wastes since there are two kinds, forest waste and mill waste, that vary greatly in cost of collection. Even aside from cost of collection there are costs to be paid, present or prospective, direct or indirect. Let us look at this subject from the standpoint of the technologist interested in developing processes for the chemical utilization of wood waste or in putting such processes into commercial operation, for he is the man that must consider costs. Even though the material is now running to the waste burner he cannot expect to set up a plant on the site of the burner and obtain the waste free of charge. The mill owner naturally wants to get a share of the profits made on the use of *his* raw material, and the waste utilizer expects to pay enough for the waste to obtain a contract for a continuous supply. So much for present costs. Now suppose that a 5- or 10-year contract is made at a fairly low price and the utilization plant operates apparently successfully until a new contract must be made. This time the sawmill man will get a larger share in the profit because he is in a position to bargain for it. The utilization plant is already built and perhaps the owner would prefer to pay more for his raw material rather than to move his plant elsewhere (or, as happened once, he might prefer to dismantle his plant and go out of the business). The wood utilizer must therefore reckon on both present and prospective costs.

Suitable arrangements may often be made for obtaining at a reasonably low price all or a part of the mill waste that is actually waste, *i. e.*, that which goes to the burner. As has been already pointed out, however, certain utilization processes may operate on such a narrow margin of profit that the difference in efficiency between a 100-ton plant and a 50-ton plant might be equivalent to the difference between a small profit and a small loss. If such a plant is operating at a mill that has only 50 tons of actual waste, it can not expand its operations to a 100-ton capacity without paying a higher price for its raw

material. Here is a situation where everyone concerned, especially the sawmill owner, soon realizes that the wood used as fuel is not waste but has a value equivalent to the cost of other fuel to replace it. The wood waste utilizer may be able to obtain small quantities of wood at a low cost, but if he finds that larger quantities are required he must pay at least fuel value for it. It might be suggested that this difficulty could be remedied by collecting forest waste but the cost of collection is likely to be higher than the fuel value.

It is recognized that this discussion of costs may seem trite and self-evident, but it is known that some of the points brought out have been overlooked in certain expensive attempts at wood waste utilization. The discussion is introduced here largely for the purpose of showing that the most promising chemical wood utilization processes from the standpoint of low cost of raw material are those for which sawmill waste is suitable and small quantities are sufficient.

Competition of Agricultural Wastes

The possibilities of future developments in the chemical utilization of wood waste are affected by a situation that is not commony recognized as important. There is so great a similarity in chemical composition between wood and various agricultural wastes that the latter may be strong competitors in furnishing the raw material for a chemical utilization process. This is no place to discuss the details of this similarity but it can be briefly and not inaccurately covered by the statement that the woody stems of most agricultural wastes, such as straws and stalks, are more closely related chemically to the hardwoods than the hardwoods are to the softwoods. In fact, this similarity is close enough so that much of the previous discussion of suitability, costs, effect on values, and availability of supplies, applies more properly to wood and agricultural wastes combined than to wood waste alone.

Benefits of Chemical Utilization

It must be recognized that the subject has been discussed so far only from the standpoint of the probable effects of chemical utilization on the value of the waste. This point of view has been purposely chosen in order to correct any impression that the future profits of forestry are likely to be considerably increased by the chemical utilization of wood waste. Stressing this point of view may have given the incorrect impression that attempts to improve waste utilization by chemical methods are not worth while. Only a brief discussion should be necessary to correct such an impression.

While the previous discussion has indicated that chemical utilization is not likely to give a *high* value to a *large* amount of wood waste, it has shown that the opportunities are good for giving either a slight increase in value to a comparatively large amount of waste, or a comparatively large value to a small amount of waste. Furthermore, there is so much wood waste available that even a *low* value given to even a *small* part of it by chemical utilization would amply repay great efforts to develop the successful waste utilization processes. It should also be emphasized

that the very conditions that are unfavorable for the attainment of high values for wood waste, such as the large supplies in comparison with the probable small demands, are extremely favorable for the future expansion of chemical utilization. A chemical manufacturer in these days of large-scale, low-price operations and severe quality competition will not look with favor on a prospective raw material that is not plentiful and cheap and certain to remain so.

What is perhaps the main beneficial effect of waste utilization can not be measured by the direct dollars-and-cents increase in selling price of the waste. As was previously pointed out, if the owner of the waste also operates the utilization process, he may or may not credit the profits of the utilization directly to the value of the waste but there are still some increased profits that must be credited to the forest from which the raw material came. Even if the owner of the waste does *not* operate the utilization plant and obtains directly only a low price for the waste, yet there are many general economic benefits that must ultimately accrue to the credit of the forest—valuable commodities are produced, labor is employed, and capital is profitably invested.

It should also be remembered that chemical utilization of wood waste is more promising in its beneficial effects on forestry than those methods that produce wood substitutes. When the by-products compete with the products, the utilization of by-products become a two-edged sword—the increased profits from the utilization of the by-products may be more than counterbalanced by the loss of market for the main products. The production of chemicals, on the contrary, has no detrimental effect on the market for lumber.

We may confidently expect continued progress in the chemical utilization of wood waste. The chemical industries using cellulose as a raw material have developed very rapidly in the last few years and the opportunity seems good for wood cellulose to furnish an increasing proportion of this raw material. Lignin chemistry is still in a very early stage of development and the commercial utilization of lignin lies all in the future. Since it is so easy to be optimistic about the unknown (and to reason by far-fetched analogies) we should not be censured if we foretell that the eras of coal tar chemistry and cellulose chemistry will be succeeded by an era of lignin chemistry in which the forest will be called upon to furnish raw material for important new chemical industries.

EROSION: A PROBLEM IN FORESTRY[1]

By E. I. KOTOK

Director, California Forest Experiment Station

The necessity of maintaing a soil cover to check erosion, aside from its effect on water conservation, is emphasized in this paper and held up to the forester as a problem requiring his careful study. On badly eroded land the forester will have the dual job of devising means to check erosion and starting a new forest. Reference is made to experimental determinations of the influence of soil cover upon run-off and erosion.

GEORGE MARSH, in his work "*Man and Nature*", (1863), and later in "*The Earth as Modified by Human Action*", (1874), clearly stated the problem as to the manner and extent to which human action has changed the physical conditions of the globe. Drawing on a bibliography of 322 works, and from his own observations, he concluded that:

"The felling of the woods has been attended with momentous consequences to the drainage of the soil, to the external configuration of its surface and probably as to local climate, and the importance of human life as a transforming power is, perhaps more clearly demonstrable in the influence man has thus exerted upon superficial geography than in any other result of his material effort."

An extensive literature, covering a period of a century and a half, exists and deals almost entirely with the influence of forests on climate and precipitation. Zon, in his "*Forests and Water in the Light of Scientific Investigation*", devotes over one-half of the space to this subject.

The classical controversies between engineers and foresters, dating back to the 1870's, revolved around the part that forests play in preventing floods and regulating streamflow.

In the exhaustive literature of forestry and engineering on this subject but little space is devoted to a discussion of the problems that deal directly with the process of erosion. This factor, if introduced at all, is generally referred to as a contributing cause in some basic relationship that the investigator or author is trying to establish as to the effect of deforestation on floods, changes in the regimen of streams, and the like. Thus, erosion as a destructive and modifying force is frequently obscured in the dissertations on forest influence.

Marsh, however, singled out this factor more definitely than investigators before him and even those of a much later date. True enough, erosion as a geologic process has been recognized along with the development of geology itself; but no clear-cut distinctions have been drawn by geologists or others between the normal erosive processes and their accentuated or accelerated forms, as a significant measure of changes in the soil profile, which are themselves

[1] Presented at the 30th annual meeting of the Society of American Foresters, at Washington, D. C., December 29-31, 1930.

the crux of the whole problem of "forest influences."

Accelerated erosion, in the light of recent investigations, is the clearest evidence of deterioration processes in the natural soil profile. These in turn are caused by disturbance of the protecting mulch provided by a vegetative cover, and are themselves the cause of increased surface run-off, decreased percolation, and all the ills of malregulation which follow in their train. The soil profile, in turn, can be maintained in optimum condition only by the continuous presence of a vegetative cover. This is the forester's field,—the maintenance of a suitable vegetative cover on the earth's surface.

The Wagon-Wheel Gap experiment in Colorado was hopefully looked upon by American foresters as an answer to all the complex relationships between forests and water. It was a valuable contribution, but it failed to give conclusive results on how deforestation would affect erosive processes and the consequent influence on run-off and seepage. This experiment did not "denude" the forest, did not make any radical change in the vegetative cover that was enduring enough to affect significantly the soil profile. It merely converted, with great rapidity, a deciduous high forest into a similar coppice forest. Bates recognized in part this fact and called attention, in this work, that erosion was accentuated only in the skid roads and trails where complete denudation had actually taken place.

Erosion on watershed B of the Wagon-Wheel Gap experiment was 8.5 times greater after the so-called denudation than under the original condition. The rate of erosion from both watersheds A and B was little more than 2 pounds per acre and was increased to about 17 pounds per acres, which is an insignificant amount of material. This is directly traceable to the fact that the vegetative mantle and the soil profile had been but slightly altered.

On the other hand, at the Great Basin Forest and Range Experiment Station in Utah, studies wherein the vegetative cover, as to density of stand, was materially improved on a previously depleted area, striking differences in the erosive processes and in intensities of run-off were produced.

Lowdermilk's work, both in his tanks and on the comparative covered and denuded field plots, regardless of the original vegetation, shows that the removal of the litter and humus (the product of a vegetative cover) will immediately accentuate the erosive processes and alter the run-off-seepage relationship, when intensities of rain reach rates of one inch per hour, even for the shortest intervals of time. This effect appears to hold for gradients from 5 to 23 per cent but is considerably modified by the texture of the soil exposed.

A brief resumé of these tank experiments already reported on may be of interest. Eight experimental tanks were designed and installed at the University of California under the following conditions:

1. Soil profiles of 2.5 feet were placed in their natural order in tanks by 3 inches layers, and the humus and litter layer restored in place for three distinct forest soils.

2. Mechanical means were provided

for collecting and measuring precipitation, eroded material, surface run-off and precipitation.

3. The forest litter was burned off each alternate tank.

4. Artificial and natural rains were applied with varying durations and intensities, up to rates of 2 inches per hour.

The results were as follows:

1. Surface run-off from burned surfaces exceeded that from litter-covered surfaces by from 3 to 30 fold depending on soil types and intensities of rain.

2. Erosion for burned surfaces exceeded that from litter surfaces from 50 to 3,000 fold.

3. Forest litter permitted that soil to absorb water even under the most intense application of precipitation, and this function of litter continues even after it has reached complete saturation.

4. Forest litter maintained the porosity of the soil surface and its capacity to absorb water.

In the cover plots, areas of 1/20 acre each in pairs were set out in the brushfield types of southern California, and in the lower timber zones of the Sierra Nevada Mountains. One set of plots was burned over, so as to remove the vegetation and litter and the other left in a natural state. Mechanical provision was made to measure amounts and intensities of precipitation, amounts and intensities of surface run-off and amounts of eroded material per storm.

The results from these experiments may be briefly stated as follows:

1. The removal of the vegetation and litter increases surface run-off from 15 to 20 times and eroded material up to 1,000 times, depending largely on the intensity of the precipitation.

2. Increased surface run-off and erosion continues until a vegetative mantle is re-established.

3. Erosion and surface run-off increase simultaneously.

In the Sierra Nevada cover plots, winter storms of 12 inches increased run-off on the burned plots 20 times. The burned plot showed 2 cubic yards of eroded material per acre while the unburned produced a mere trace of eroded material. Six inches of spring rain on these plots showed 2 additional cubic yards per acre of eroded material from the burned plot and again merely a trace from the unburned.

The burned plots produced 4 cubic yards of detrital material per acre for one season—a season of abnormal precipitation.

More recently, Bennett and Chapline have called attention to erosion as a national menace. Bennett devotes his discussion almost solely to loss of agricultural soils by erosion through improper methods of cultivation. Farming, in the process of tilling, must deal with exposed soils which will always be subject to erosive processes. A good deal of such farm land falls in the category of marginal crop lands, and might best be allowed to revert to forest or range, until the necessity for its use as agricultural land becomes more urgent. As public recognition that such lands should be converted back into forests is translated into a national policy foresters will have a dual job, one of arresting erosion on the spectacular bad lands

scattered throughout the nation, and one of putting forests back on the lands themselves. But besides these lands, vast areas of forests, through fire and destructive logging, and an empire of range land in the public domain, subjected to the abuses of unregulated grazing, have had a continuing history of accelerated erosion. Here nature has not been given any opportunity to adjust itself. The foresters again have an outstanding opportunity for service. Obviously, the first step towards a solution of the problem is to place these lands under control and management and to check the abuses at their source, be they fire, destructive logging, or overgrazing. Then must follow a laborious process of re-establishing a climax mantle of natural vegetation, building up the soil profile and putting the lands into productive forest and range crops.

Lowdermilk, elsewhere, has pointed out that man's search for tillable land has driven him to the forests and mountains, where the maintenance of a soil profile, through a well-established vegetative cover, is of utmost importance in checking disasters arising from the insidious process of accelerated erosion. China is now paying the price for an exaggerated form of this abuse.

In their attempt to connect deforestation with changes in climate, frequency of drought cycles, torrential floods, pestilence and plague, foresters have gone far afield and have failed to go back to the land and see how human abuses have altered the land surface itself and removed the soil which is, after all, the most important natural resource that we have.

In the western United States, where irrigation is essential for agriculture, and where water must be impounded for domestic and industrial use, the effect of changes in the vegetative mantle on the processes of erosion, has been receiving considerable public attention. For example, California is now contemplating the expenditure of 500 million dollars for the creation of a statewide water system, bringing the waters from the Sacramento drainage into the San Joaquin, and with a series of low dams impounding waters in the more arid San Joaquin and Southern California drainages. This expenditure does not include the proposed developments at Boulder Dam.

The watersheds behind this monumental project embrace at least 20,000,000 acres of forest lands, and a like amount of brush and grassy foothills, used at present for the grazing of livestock. The engineering plans, so far, have given little consideration to how the land management of these watersheds will affect their investment in reservoir capacity nor the amount of available run-off. Here for the first time on any large scale, stress is laid on a by-product of the forest which is determined by the manner in which the vegetative crops of the forest are handled.

The Burbank flood in Los Angeles County illustrates both the influence of a vegetative cover on run-off and erosion and the high costs involved in removing detritral material.

In the fall of 1924 the Burbank watershed of 704 acres was burned over. No intense storms occurred during 1924 and no great increases in run-off or in erosion were noted. In the spring of 1925, a storm which reached high in-

tensities for only about 10 minutes, at times as high as 2 inches per hour, visited this region. The total rainfall for this entire storm was only 1.07 inches but as a result of it 25,000 cubic yards of material came off the watershed and buried part of the city of Burbank. Property damage was exceedingly high. The cost of removing the detritus was estimated at $25,000 to $50,000. Eighty per cent of the precipitation came off as run-off. Adjacent canyons, on which the cover was not recently disturbed, were also visited by this storm, but showed no immediate surface run-off and no movement of eroded material.

Accelerated erosion in the arid West will mean generally the silting-up of artificial reservoirs; the sealing-up of the spreading systems where water is permitted to reach natural under-ground reservoirs; the increase of winter run-off and the prevention of maximum penetration where spreading-ground systems must be used.

The hydraulic engineer in the building of even the costliest water systems, justifies expenditures on whether or not the capital invested in a project will be returned with reasonable profits in a comparatively short period of time. Thus, the engineer appears to be satisfied in building a system of reservoirs, creating an enormous dependent agricultural enterprise, and permitting all to vanish 100 years hence, if the capital investment is safely returned with dividends.

The forester here has some specific jobs to perform. We must know definitely just how fire, through removal of the cover, litter, and humus, will affect run-off and erosion, and how long this process will continue and the means we can take to hasten the re-cloaking of the surface. We must know which system of grazing management can be employed without detriment to the watershed values, and how lands already punished by overgrazing can be restored to an acceptable condition. We must know, further how various cutting methods in the forests will adversely affect this water relationship. And in this analysis we must subject even the present recognized systems of silviculture and range management to the test whether the processes of erosion are accentuated or not. Most frequently we will find that the silviculture and range management which produce maximum crops will perforce embody maximum safeguards against accelerated erosion. In other words, we will look not only to the seed trees and advance reproduction and to the kind and amount of grasses, but as well to the soil and the areas laid bare of vegetation.

Bates and Zeasman, in their recent publication, "*Soil Erosion,*" have made a splendid contribution. They clearly show that the soil erosion problem is not merely that of loss of soil itself, but that it brings in its wake a series of detrimental processes, among which the following are worth nothing here:

1. Water is lost to ground storage.

2. Soluble plant foods are carried away and lost to the soil.

3. Light organic matter is reduced and lost.

4. Small streams, as well as large, overflow their banks from an excessive silt load.

The approach to the problem of the forest and water relationship, in the writer's opinion, can be most successfully made by concentrating on the erosion phase of the whole problem. The evidence that forest and other vegetative mantles prevent abnormal or accumulative erosion is already sufficient. We should merely be concerned in determining the relationship in a more exacting quantitative and qualitative way. Along with this must come investigations to determine how soil destruction can be avoided or minimized by the maintenance or the restoration of the vegetative mantle. No forester can quarrel with the engineer's part in the solution of this vexing condition brought on by land mismanagement. The forester, though, as Bates very aptly puts it, has at his disposal simple remedies following the naturalistic method. The justification for proposed enlarged forest programs by nation and states need not hinge entirely on the necessity for wood and forage crops, aesthetic enjoyment or recreation, but on the more fundamental necessity of maintaining our soil surface and keeping our rivers in check. Thus the preservation and upbuilding of our soils is a new challenge to American foresters which must be met without equivocation or procrastination for the enduring benefit of posterity.

THE EFFECT OF DEFOLIATION ON TAMARACK[1]

By SAMUEL A. GRAHAM

School of Forestry and Conservation, University of Michigan

The author reports a remarkable resistance of tamarack to defoliation, and he finds this species to respond more nearly like a broad-leaved tree than a conifer. Experiments of different degress of defoliation are described as well as the result upon needle development, increment and survival.

WHENEVER a leaf-eating insect is studied the effect of defoliation upon the trees should always come in for consideration. Strange to say, however, these effects are frequently overlooked or are taken for granted with the result that opinions concerning them are expressed on the basis of general observations or personal beliefs. It is sometimes said that moderate defoliation causes little or no damage, and frequently no damage is recognized unless the trees are practically killed. The losses in increment and other less conspicuous effects are often disregarded, or when they are taken into consideration the observations are frequently conflicting. Therefore, in investigations of larch sawfly, attacks on tamarack, we have felt that a study of defoliation effects was a phase which should not be negelected.

One of the most remarkable features of tamarack is its tenacity to life under defoliation. These trees may be defoliated year after year and still continue to throw out new needles. Only after a considerable series of successive intense defoliations do they succumb.

In the great outbreak of two decades ago the tamarack was stripped for six successive years to a degree that would have been fatal to most trees in a much shorter period. As a result of these successive defoliations practically all the merchantable trees appeared to be dead. Only the small trees produced sufficient amounts of foliage to be noticeable during the years following the outbreak. At that time it was almost impossible to find a stand of living merchantable tamarack. Men in the woods insisted that all the trees had been killed.

Neverthless ten years later some of these trees which to all appearances had been dead at the end of the outbreak had begun to take on a green appearance. Close to the main stem they were sending out foliage and small branches. A check at that time indicated that about one-third of the trees above three inches d. b. h. had survived the outbreak. Today many trees which were apparently dead in 1913 are alive and have moderately developed crowns.

Out of these observations there arose a number of questions which could be answered only by experiment. For instance, how much defoliation can a tamarack tree survive? What effect does heavy defoliation have upon woody growth? Does a moderate amount of

[1] Presented at the 30th annual meeting of the Society of American Foresters, at Washington, D. C., December 29-31, 1930.

defoliation have an appreciable effect upon increment? Does defoliation affect the amount of foliage that will be produced in subsequent years? During the past seven years, information bearing on these questions has been collected and analysed both through experiments and through field observations.

The work upon which this paper is based was started as a part of a larger project while the author was engaged in forest insect work at the University of Minnesota. The field work was all done in and near Itasca State Park where laboratory and other facilities were provided by the Division of Forestry, University of Minnesota. Since the autumn of 1927, the studies have been conducted coöperatively by the Universities of Minnesota and of Michigan. The Minnesota State Forest Service has consistently aided this and other entomological investigations in Minnesota, and the Bureau of Entomology up to 1928 contributed materially. Without the unselfish spirit of coöperation exhibited by each of these agencies our study of the larch sawfly, of which this is a part, our study of the spruce budworm on both fir and pine, and our study of the jack-pine sawfly would have been much handicapped.

Conditions of the Defoliation Experiment

During the summer of 1924 at Itasca Park a set of five year old trees was selected for defoliation tests. These trees were located on the east side of a small block of tamarack in the nursery. The outside row was selected in order to avoid complications due to competition. Unfortunately, in spite of the defoliation the trees grew much more rapidly than had been anticipated and as a result competition played a much larger part in the final results than was desirable, thus masking to a certain degree the effects of defoliation. For this reason the conclusions from the experiments are not quite as clear cut as might be desired. Nevertheless they are significant.

The trees were divided into five groups of ten trees each and each of four groups was defoliated while the fifth group was held for a check. Each of the four defoliated groups received a different degree of defoliation. From the first, 25 per cent of the leaves were removed, the second, 50, the third, 75, and the fourth was completely defoliated. This work was done for 4 successive years in late June or early July at the time when the sawfly was producing its maximum effect in the swamps.

In performing this defoliation each fascicle to be removed was either pinched off between thumb and finger or snipped off with small scissors. The proper degree of defoliation was secured by removing the appropriate number of fascicles in each case. For instance every fourth fascicle was removed for 25 per cent defoliation, every other one for 50 per cent, and three out of four for 75 per cent. As we have stated the trees were defoliated in this way for four successive years. It was expected that defoliation would have so slowed up the growth as to permit the continuance of the stripping through the fifth year, but by that time the trees in all except the 100 per cent group had

grown so much that their defoliation was impracticable.

The Amount of Defoliation a Tree Can Endure

We had known from general observation that tamarack is much more resistant to defoliation than other conifers. Spruce and hemlock, for instance are killed by a single complete defoliation or by a very few years of heavy stripping, whereas, in the sawfly-infested tamarack swamps it is not unusual to see trees survive in spite of repeated heavy defoliation. Even the loss of from 60 to 80 per cent of the needles often fails to kill the trees. Under these natural conditions the degree of defoliation varies from year to year and it is possible that during the years of relatively light injury the trees are able to build up a sufficient food reserve to see them through a difficult year or two. But it was not expected that tamarack exposed to continuous injury such as that inflicted during this experiment would prove as resistant as was demonstrated.

All ten of the completely defoliated trees put out new foliage after three successive years of defoliation whereas two trees had a few needles and a small amount of green cambium at the end of the experiment after four successive complete strippings. At the end of the experiment the trees from which only a part of the leaves were removed were to all appearance in excellent condition. A careful comparison, however, showed somewhat thinner foliage on the 75 per cent group than on the other trees but unless the checks had been available for comparison it is certain that even the poorest trees on superficial inspection would have been declared normal in crown and foliage development.

An examination disclosed the fact that much injury had resulted to the roots in the completely defoliated trees. All the fine roots were dead and to a considerable extent decayed, while the larger roots were almost all dead. In the partially defoliated trees we found quite a different condition. The root systems appeared perfectly normal. Certainly no appreciable injury had been done to these organs even in the trees which were 75 per cent defoliated. In this feature tamarack differs from some, at least, of the other conifers for Craighead has determined that the small roots of balsam fir are seriously affected by partial defoliation.

Thus in its response to defoliation tamarack behaves much more like a broad-leaved tree than like a conifer. Doubtless this is a result of the deciduous habit and the ability to replace leaves, that may be lost, with a second crop during the same season.

Effect of Defoliation on Leaf Size

At the end of the experiment sets of 200 fascicles were taken from each tree. These were oven dried until they ceased to lose weight, and the dry weight of each set determined. A comparison of the average weight per fascicle in the various groups shows that those from the check trees were appreciably larger than those on the defoliated trees. The smallest fascicles occurred on the trees most heavily defoliated. Table 1, indicates this relationship.

It will be noted that although the data are significant, the ratio of probable error to the mean is not as high as might be desired. It is felt that in these data, as in the growth data which will be presented later, competition between the trees in the experiment has masked the results to some extent and if it had not been for this condition the variations in the samples taken from each group would have been less, with a correspondingly smaller probable error and correspondingly higher ratio.

In connection with another set of experiments, the purpose of which was to determine the quantity of foliage required by sawfly larvae during their developmental period, certain entirely unexpected local defoliation effects were observd. In the summer of 1929 it was noticed that the needles on branches where sawfly larvae had been fed in 1928 were noticeably smaller than during the previous year. Furthermore, the branches which had been most heavily defoliated had died back at the tip, while one on which excessively heavy defoliation had occurred died after a vain attempt to produce a crop of needles. The trees on which these effects were observed had suffered almost no defoliation except that resulting from the feeding of larvae in experiments. The total percentage of defoliation was certainly not more than 1 per cent.

The average weight per fascicle during 1928 had been determined indirectly for each branch on which larvae had been fed by determining the weight of needles on similar adjacent branches. Thus by actually weighing the 1929 needles it was possible to calculate approximately the reduction which had occurred. Needles from adjacent branches were also weighed in 1929 and showed no appreciable change in the average dry weight per fascicle or undefoliated branches. The branches defoliated in 1928 which leaved out in 1929 showed losses in weight per fascicle of from 3 mg. to almost 12 mg., with an average loss of approximately 8 mg. The reduction in weight per fascicle appears to be directly correlated with the intensity of the previous year's defoliation. (Figure 1.)

From these results it would appear that the effects of defoliation may be very local and affect appreciably only those parts of the tree on which the actual injury occurs. Since the upper parts of the trees are usually most heavily fed upon by the sawfly, it is therefore not surprising that trees sometimes become stage-headed, as a result of defoliation that has affected other parts of the crown very little.

TABLE 1

EFFECT OF DEFOLIATION UPON WEIGHT OF NEEDLES

Degree of defoliation	Average Weight per fascicle in milligrams	Probable error of mean	Ratio	Standard deviation
Undefoliated	25	±5.3	4.72	5.9
25 per cent	19	±4.2	4.52	5.0
50 per cent	19	±4.0	4.75	4.7
75 per cent	17	±3.4	5.00	3.9

Effect of Defoliation on Increment

At the end of the fifth year the trees were dug up, weighed, measured, and shipped to Ann Arbor for further analysis. The gross weights and measurements indicated a rate of growth in keeping with the degree of defoliation. In addition to these gross measurements a very careful analysis of each stem was made and it is on these data that most of our conclusions on growth are based. Measurements of a series of cross sections at intervals of one-half meter along the stem were made on each tree. Because of the irregularly eccentric growth it was found that no point could be selected on the cross sections which would give a fair representation of the annual growth for every year. Therefore the planimeter was used to measure each individual ring. From these data a tree diagram was constructed in the usual way and by the planimeter method the increment was determined for each year.

The final results showed a definite relationship of growth to defoliation between the various groups, but within each group some interesting variations in growth were noticed. Some of these variations were due to competition, as previously mentioned, but some appeared to be due to individual idiosyncracies. Some trees grew faster or slower than their neighbors because it was their nature to do so, and some trees responded to defoliation in other most peculiar ways.

Some trees are conservatives and seem to husband their resources against a "rainy day," while others are liberals and risk their resources on desperate chances which, if successful will put them far ahead of the field and if unsuccessful may lead to disaster. For instance one of the trees in the group which was completely defoliated so husbanded its resources that it was able to slightly increase its annual increment during three successive years of complete defoliation. Another tree in the same group produced almost three times as much wood during the first year of defoliation as it had during the previous five years of its life. But from that high peak its growth dropped off sharply.

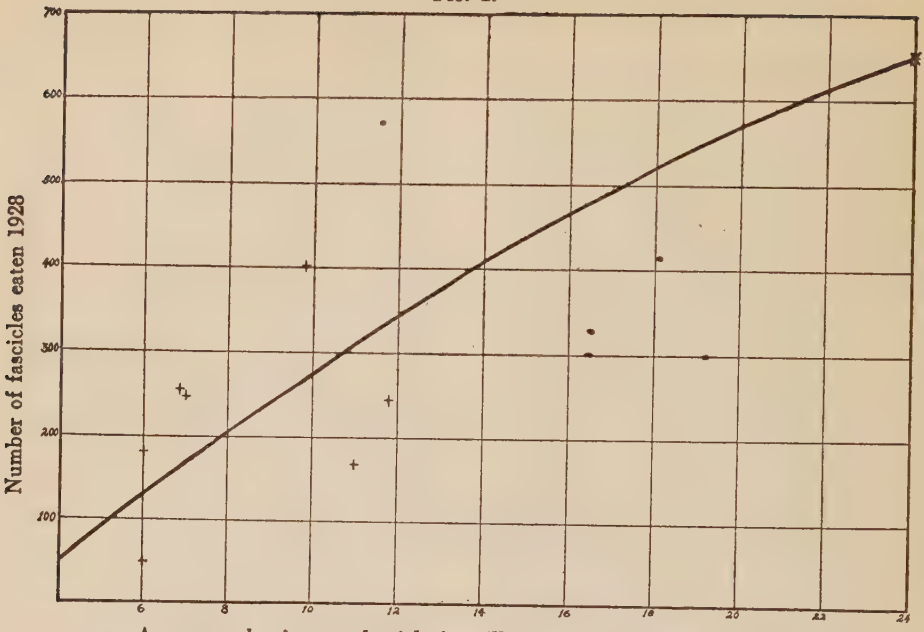
On the average, however, the loss in growth was directly proportional to the amount of defoliation.

In Table 2 again the probable error is higher than we should like, due to individual variations and competition. Curves based on the annual increment in each defoliation class show a decided reduction in rate of growth during the period of the experiment. Examination of these curves will show that in spite of defoliation the average increment increased each year under all degrees of defoliation except 100 per cent. (Figure 2.)

This relation is evident in the graph showing average annual increment in actual volume, but when the increments are expressed in relative terms, thus eliminating in part some of the irregularities resulting from factors other than defoliation, the relationship is much more striking. (Figure 3.)

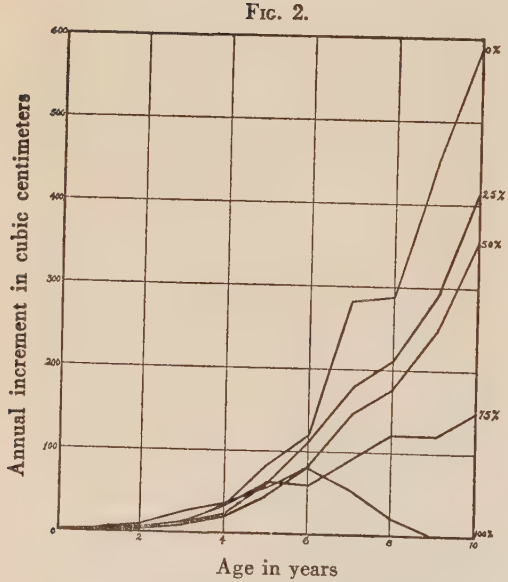
From these curves it will be observed that the growth rate seems to fall off gradually in the 25 per cent, 50 per cent, and 75 per cent groups, but that in the 100 per cent group the response to

FIG. 1.



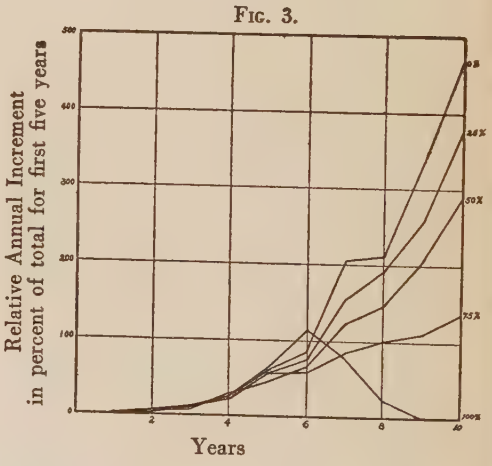
Average reduction per fascicle in milligrams of dry weight in 1929 following defoliation in 1928

FIG. 2.



Age in years

FIG. 3.



Years

Effect of defoliation upon amount of foliage and annual increment

defoliation is quite different. During the first year of defoliation growth receives a decided stimulus. In each of the other groups, including the check, growth was reduced in the sixth year, the first year of defoliation. But the trees in the 100 per cent group shot ahead with more than a 100 per cent increase in growth over that of the previous year. This increase was followed by an almost equally sharp decrease in succeeding years, until after the third year of the experiment when growth practically ceased.

From these data it would appear that complete defoliation results in stimulating excessive use of stored food material presumably in an effort to repair the injury by growing a new set of leaves, but incidentally wood is produced as well. Most of the increased increment is in the basal sections whereas the upper sections show little increase or an actual reduction. Individual trees in the 75 per cent group also show this peculiar response.

A similar response has been observed by Craighhead in balsam fir and spruce following heavy defoliation by the spruce budworm. The author and his assistants observed a similar condition in fir and spruce following heavy defoliation by the spruce budworm in northern Minnesota, but were unable to find these growth responses in defoliated jack pine. Analysis of tamaracks in the swamps has in some instances indicated a stimulation of growth during the first year of defoliation but it was observed in such a small number of trees that it might have been a coincidence.

These conflicting observations may be explained very satisfactorily on the basis of the facts presented in this paper. From these data it appears that when tamarack is completely defoliated the trees are so stimulated as to produce excessive growth during the first year. If defoliation is repeated a sharp decline in growth occurs. On the other hand when defoliation is not excessive the stimulation is not apparent, and injury is immediately followed by a loss in growth.

Table 2

EFFECT OF DEFOLIATION UPON INCREMENT

Per cent defoliation	Average Total volume in cubic centimeters	Probable error	Ratio probable errors to mean	Standard deviation
0	1873	±462	4.05	2165
25	1318	±227	5.81	1063
50	1124	±111	10.22	522
75	665	±74	8.97	364
100	226	±37	6.07	175

Summary

1. Recovery of tamerack trees which had to all outward appearance been killed by the larch sawfly suggested a number of questions which could only be answered by experiment.

2. Experiments intended to show how

much defoliation tamarack can endure, the effect of defoliation upon growth and the production of leaves in subsequent years, were started in 1924.

3. Four sets of 10 trees each were defoliated for four successive years and left undefoliated during the 5th year. The trees were then dug up and the effects of defoliation analysed.

4. Defoliation causes a reduction in the size of the needles in subsequent years and its effects may be localized in the parts defoliated.

5. Complete defoliation killed the trees after three successive years although two trees showed some signs of life after four years. Partial defoliation failed to kill even at 75 per cent intensity.

6. Complete defoliation affected the roots as well as the tops but partial defoliation did not affect the roots to an appreciable degree.

7. Increment is reduced in direct proportion to the amount of defoliation.

8. Partial defoliation results in a relatively gradual reduction in increment.

9. Complete defoliation results first in an increased growth followed by a rapid falling off in increment.

10. Certain individual trees failed to react like the majority. These were usually individuals which were suffering from competition with their neighbors.

RECENT TECHNICAL ADVANCES IN FOREST FIRE CONTROL[1]

By S. B. SHOW

Regional Forester, California District, U. S. Forest Service

With fire protection constantly improving but with some lands still under-protected it becomes increasingly important to so allocate the funds and plan the protection organizations as to bring the inadequately protected areas and regions up to the par of those whose protection is considered acceptable. The author discusses a number of points that must be analyzed in determining standards or objectives, the hour-control required to obtain the objectives and the translation of hour-control into adequate fire protection organizations.

THE FIELD of fire control is so vast, so diversified and so complex, and absorbs the thought and effort of so many foresters, that to single out a few recent achievements, and to assert that they are the outstanding ones is indeed a difficult task. The relative weight and importance of a particular advance in method or technique varies from region to region, depending, of course, on many considerations. What may be of dominant value in one region can easily be of relative insignificance in another.

As an example, consider the educational campaign of the American Forestry Association, coöperating with many other agencies, in the South. This is truly a major undertaking in the field of fire prevention, involving the change of habits of thought and action of a large portion of the people. No doubt it is the major fire control project in several important forest States. What is learned of educational methods and technique should be of great value in other regions with a similar fire prevention problem. But to large parts of the Pacific Northwest, where the forest fire problem is almost wholly one of bunched lightning fires, the results of the project cannot be of much immediate value.

In the same way, there have been important recent advances in developing water tank trucks for use in suppression in the forest regions of the West Coast. Here the problem is one of a very heavy, inflammable cover, and with very rapid initial spread of fire. To catch such fires small, the use of men, shovels, and axes is often hopelessly inadequate—water in reasonably large quantities is essential. The progress so far made in devising specialized machines for suppression is thus a major step in the regions with heavy cover and rapid spread —one that will catch many fires small, which otherwise would become large. But in other regions, where the cover is lighter, and where fires ordinarily spread more slowly at the start, such advances in mechanizing suppression may well be of academic interest only.

There are other technical advances, deserving the attention of the profession. One is the progress in forecasting

[1] Presented at 30th annual meeting, Society of American Foresters, at Washington, D. C., December 29-31, 1930.

fire weather, both on a regional and on a local basis. The need for and practical use of this obviously varies greatly from place to place. Another is the development of methods of hazard reduction—an activity now receiving attention in many regions and by many agencies. The need for this varies with amount of fuels, ease with which fires start, and character of the risk. Yet another technical advance is in the field of fire prevention through restriction in the use of forest lands by the public. Such methods as those now under test in some of the western National Forest Regions, including shovel and axe requirement, campfire permit, camping on prepared grounds, and registration of visitors have significance for some regions; much less or none for others.

All these activities are worthy of much more extended description and discussion, both as new ventures in methods and as parts of the regular practice by which many agencies are striving to master the fire problem. It is safe to assert that all have significance for some regions other than those in which they are being developed; all have contributed something toward mastery of the fire problem; all need to be done more intensively rather than less.

Important as these and other ventures are, and much as they mean, singly and in the aggregate, to forest fire control, they do not rank at the top among recent advances.

If we ask the question for each forest type and forest region "Exactly what is the objective of fire control?", the lack of definiteness of much of our thinking shortly becomes evident. One man or organization will answer "To hold the area burned to a reasonable minimum." Another will reply "To eliminate large fires." Still another "To make timber growing and sustained yield a genuine possibility." And so forth. All such answers or stated objectives in fire control indicate thought on the subject, but all are couched in philosophical terms, meaning different things to different men. All lack definiteness.

It is, of course, easy to dodge the whole question by saying that as forests become more valuable or important, what may seem to be adequate protection today will not be adequate in the future. Or the question may be evaded equally well by analyzing the great amount of information needed for an intelligent reply, such as facts on fire damage, length of rotation, and rapidity of natural recovery of burned lands. Anyone so disposed can then refuse to study the question until a vast deal of additional research work has been done.

But consider the other side. Lack of definiteness in stating fire control objectives means lack of definiteness all along the line. It means that the practising foresters in fire control organizations cannot be sure whether holding the burned area to a given figure over a period of years represents success or lack of success. Thus it means generally a buiding up of protection effort on units which have already attained a consistently low burned area record. It means a deal of uncertainty in planning and building the system of roads, trails, and other protection improvements needed on most protected areas of wild lands. It may mean an unwarranted

degree of satisfaction with a given level of attainment in fire protection.

In external relations with the public, with appropriating agencies, with other professions, a lack of definite objectives is certainly disadvantageous. A very large part of organized fire control is handled by public agencies—county, state, and federal. Public support of the idea of systematic protection of forest land and forest values is wide-spread. Public support in the tangible form of money, while far from reaching the level that many of us may desire, is still far from insignificant. On the whole, it seems probable that forest agencies have somewhere won the support that our own statement of needs deserves.

This line of thought may give an idea of the major strategy of fire control. The agencies responsible for furnishing the sinews of war must generally be interested in knowing not merely what is most urgently needed for a single year, but what the eventual size of the fire control job is. It does not seem unreasonable to expect from the profession which is handling the actual job, clear-cut, definite statements of just at what it is driving, just what kind of a program will be needed to realize this goal, and related questions. Such long-term programs should command respect and support, to the degree that they are based on fact, are demonstrable, and defensible. Some of the important forest agencies have already made a splendid start in this direction.

It should be clear that the essential first step toward this end is further expansion of the project just discussed. Even granting the obvious need for much more information before objectives can be permanently set, there does exist the opportunity, with what is now available, to focus and dramatize the magnitude of the fire control job, either nationally or regionally, more effectively than it has yet been done. This is certainly a project in which the profession, as well as the various forestry organizations, should be interested. One of the important recent technical advances in fire control which appears to me worthy of discussion is in exactly this field.

For some years past, the Forest Service has had and used a set of definite figures for the fire control objectives. These have been in terms of average allowable annual burned area as a percentage of total protected area. For major regions, the figures varied from 0.1 to 1 per cent. The figures were useful, but lacked to a degree refinement and correlation between regions. A somewhat similar set of specific objectives was prepared by the States cooperating with the Forest Service under the Clarke-McNary Law. It, too, appeared to lack regional correlation.

The National Forest figures were carefully studied and revised last winter by a committee at the Regional Foresters' meeting held in Washington. The results of this undertaking are a distinct step toward clearer and more definite thinking and planning in fire control. The primary basis was taken to be the major timber type, with no attempt to subdivide into a multitude of local or minor sub-types.

The factors considered in arriving at indices for the types were:

1. Timber value—present or potential.
2. Destruction of site value by fire.
3. Difficulty of re-establishing the forest following fires.
4. Creation of future fire hazards which will prevent maintenance of the forest.

It was agreed that the highest average damage per acre ordinarily occurs in the spruce and white pine types. The comparative damage in other principal types occurring in the National Forests, east and west, was then determined by estimating the area of burn that would result in damage equal to that incurred on the average burned-over acre of white pine or spruce.

Since it was regarded that complete fire exclusion in the next decade is obviously impracticable, the committee set up 0.1 per cent as the permissible average annual acreage burned for white pine and spruce. Other figures for the other types were then obtained by comparison.

The final range of accepted values was between 0.1 per cent per year for white pine and spruce and 1.5 per cent for parts of the longleaf pine type. Watershed values, considered separately, were given ratings of from 0.4 to 1.2 per cent, depending on the degree of damage by fire and intensity of use of water. The great immediate value of this job has been to put fire control objectives on a factual basis, so far as the facts were known, and to kill the idea that if 0.1 per cent were the right objective for white pine in Idaho, or spruce in New England, it was therefore the right figure for southern pines or for Rocky Mountain lodgepole pine.

Although the committee stated that it did not regard the set of values as final, it can safely be said that it is a very great improvement over previous efforts and is defensible.

With such agreed-upon figures established, it is possible to determine how closely the actual performance of a given unit—a National Forest, for example—measures up to the desired objective. In doing this, of course, it is necessary to take either a period of years—say five—or to take the more difficult fire years. Obviously a single year is too uncertain, because of the wide fluctuations between years on a given unit.

As this project was worked out by the Regional Foresters' committee, the next step involved the rating of all National Foresters against their agreed-upon minimum burned area objective. For the sake of simplicity, three broad groupings were used. The first of these included those National Forests on which the average burned area was decidedly below the objective—in other words where full success had been consistently attained. For identification these were designated "Acceptable."

The second group included those National Forests on which the average burn approximately equalled the objective. These were designated "Marginal" forests. The third group included National Forests on which the burned area greatly exceeded the objective, averaging, as a matter of fact, five times as high. These were designated "Critical" forests.

At this point, a study of fire protection finance showed that additional effort was planned for the forests in all three

groups, although the greatest need was obviously on the "critical" group. The committee considered that, as a matter of broad financial and organization policy, additional resources should be applied to "critical" and "marginal" forests in the ratio of 2.5 to 1. Quite naturally, it was represented to the committee that additional effort was needed on many of the "acceptable" forests, because something might happen that was outside of previous experience. Admitting the truth of this point, the committee ruled that in the face of known deficiencies on many other National Forests, it would be an untenable policy to give immediate consideration to "acceptable" forests.

The additional clarification of the National Forest fire problem represented by this study has had and will have far-reaching values. It will mean greater certainty in determining when the goal has been attained, unit by unit, in placing additional effort where it is most needed, and is an indispensable first step in planning the ultimate size of the fire control job.

In the Clarke-McNary coöperative field, a start has been made in the same direction. There are even greater difficulties here than in National Forest protection. The need for interstate correlation on a factual basis appears to be considerable, and a decision, state by state, or region by region, as to just what accomplishment in terms of area burned, represents the goal of success from the standpoint of federal participation. It is almost needless to say that if, for example, 0.1 per cent average annual burn is regarded as success in a New England state, for Clarke-McNary purposes this is no bar to additional protection effort on the part of the state itself.

But the whole field of specific fire control objectives on lands receiving Clarke-McNary funds seems to need the sort of clarification that a nation-wide study, similar to that already made for the National Forests, might accomplish.

With the rather rapid increase in public appropriations for fire control, a problem presses for solution which could well be ignored in the pioneering days. The simplest way to state this is by the question "Just what hour-control is necessary to attain success in each major type or region?" The term "hour-control" means the organization, and facilities necessary to discover, report, and send men to reach fires within a specified length of time after fires start.

For many years on the National Forests with a skeleton organization, there was no great need for visualizing or planning the ultimate fire control system. Any additional funds obtained for protection personnel, for roads, trails, or other protection improvements, could be used in many needy places. This is still true, but the time is apparently approaching when definite decisions on required hour-control and the organization to attain it are needed.

The hour-control actually required in a given type or region depends primarily on the rate of spread of fires in the bad fire years. It should be obvious that it is the bad years; that is, those with most rapid spread of fire, which form the test. It is not enough to hold the burned area to a satisfactory figure in the less difficult years. The hour-control and the necessary organization and fa-

cilities to attain it, need to be planned to meet the more difficult seasons.

One important reason for the scarcity of attempts to really determine hour-control needs has been that it can only be done by studying and analyzing actual fires over a period of years. No method based on assumption, scanty data, or laboratory technique, seems likely to yield results of usable value. Thus an accumulation of rather complete fire records over a period of years of variable difficulty is an unavoidable prerequisite.

One attempt to work out hour-control needs, using the accumulated fire records, is that which E. I. Kotok and I worked out from the National Forest data in California ("The Determination of Hour-Control for Adequate Fire Protection in the Major Cover Types of the California Pine Region," U. S. Dept. of Agri., Bulletin 209). The exact methods employed and conclusions reached are probably of no particular importance for other regions. It may be of general interest to say, however, that, using the data collected by most fire control organizations, it proved in this case entirely feasible to work out hour-control needs for the major types. The spread of final values was from 0.75 hour-control for such types as yellow pine and the brushfields, up to 4-hour-control for the true fir and alpine types. These values differed quite substantially from those previously used in the same region, based on scantier data and judgment. Unless and until basic fire control objectives are changed materially, or until a new level of severity in fire seasons is experienced, the present figures are likely to stand the test of time.

With definite objectives or goals, in terms of speed, it is then possible to plan the definite personnel and facilities required to attain the needed hour-control. Without such specific targets, the planning and construction cannot of necessity be as clear-cut as is desirable.

Whether or not this particular technique proves applicable in other regions is, of course, a matter for future determination. The project has recently been inaugurated for a number of the National Forest regions having a difficult fire control problem. The tests thus to be made should be of great value in determining the applicability of this method, or in devising alternative techniques.

The translation of a specific hour-control objective into a definite fire control organization, with all the roads, trails, telephones, and equipment which are a necessary part of it, is clearly a difficult and involved job. It is worth noting as part of this discussion that the technique of this translating has been worked out by T. W. Norcross, Chief Engineer of the U. S. Forest Service, for the problem as it exists on the National Forests. A description of the method is impossible within the limits of this paper.

The three projects which have here been considered as important technical advances in fire control are then, (1) Determination of definite fire control objectives, in terms of acceptable burned area, by major types and regions, (2) Determination of the hour-control required to hold burned area to these amounts in the more difficult fire years; and (3) The technique of translating a

specific hour-control into an adequate fire control organization and system.

The three clearly tie together in the order named. As carried out, employing the data that have been collected for many years by most fire control organizations, they should result in a tremendous advance in the major strategy of fire control. Not only that, but actual progress toward mastery of the fire problem—which still remains the crux of the forest problem in many regions—should be greatly accelerated.

As a final word, let us say that along with any renewed attack on these fundamentals must go many other things—it is to be hoped on an increasing scale. Development of specialized machines, tools and methods in fire suppression; training of men for fire control jobs, foremen, executives, and others; development and use of methods of education looking toward reduction of man-caused fires; tying in research closely to the actualities of the fire problem; and constant study of most effective use of available money in obtaining results. But these and others will certainly be most productive as the job itself and the full means to accomplish it are definitely worked out.

POSSIBILITIES OF FIRE-EXTINGUISHING CHEMICALS IN FIGHTING FOREST FIRES

By LEONARD I. BARRETT

Central States Forest Experiment Station

The author points to the discovery of the great fire-extinguishing properties of the water-soluble salts of certain alkali metals. An experiment is described which indicates that a solution of potassium carbonate has greater efficiency than water alone in extinguishing fires in dense grass and weed cover. Although many fire-protective agencies now use special equipment for applying water to forest fires, very little thought has been given to the possibility of increasing the efficiency of water by the addition of chemicals.

THE PAST history of forest fire suppression in the United States shows that little practical value has been accredited to chemical extinguishing solutions. This has been primarily due to the mechanical difficulty of getting chemicals in solution to a fire. In fact, only within recent years has the use of water been considered practical. With the advances in transportation facilities and the development of special equipment, the use of tank trucks, motor, and back-pack pumps is increasing rapidly. At the present time it is a matter of record that special equipment for transporting and applying water to forest fires plays a practical part in fire suppression methods. Since the equipment is already developed, it is a logical step forward to consider the possibilities of chemical solutions to improve the efficiency of water.

Recently, the attention of the Central States Forest Experiment Station was called to the discovery[1] that the water soluble salts of the alkali metals exhibited unusual properties in extinguishing gasoline fires. With the coöperation of a commercial firm,[2] the Central States Forest Experiment Station arranged for a test of the practical efficiency of chemical solutions in suppressing forest fires when used in a common type of back-pack pump. Potassium carbonate was chosen for use in the tests, because it combined great extinguishing properties with certain noncorrosive features which are of especial importance for use in metal pumps.

Near Columbus, Ohio, was found a small area of land which the owners desired to burn over in preparation for forest planting. The field had not been cultivated or pastured for several years and the fuel on it was composed mostly of grass and a dense cover of tall weeds. A number of plots one chain square were laid out, the boundaries marked, and the plots separated from one another by a double ploughed furrow. Each test fire was thus confined to a single chain-square plot. The tests subsequently described took place on April 3, 4, and 5, 1929.

Fires were set with blow torches by

[1] Thomas and Hochwalt, Ind. & Eng. Chem., Vol. 20, p. 575. 1928.

[2] Appreciation is expressed for the assistance given by the Fyr Fyter Co., of Dayton, Ohio.

two men, on opposite corners of the windward side of the plot and working toward each other. This system allowed the fire to advance more nearly as a straight line across the plot. When the fire was well started, a man equipped with a back-pack pump called "time" to the recorder, and began extinguishing the fire. Upon extinguishing the chain length of the fire front, the pump man again called "time." The length of time required to extinguish the fire was then recorded. The charged pump was weighed before and after each fire and the weight of liquid applied was recorded.

The above procedure was followed with both the chemical solution and water in alternate order. Pump men also changed pumps, each man taking his turn in applying the two liquids. This was done in order to eliminate the personal factor as much as possible. Twelve such tests were first made, six of them with the chemical at full strength and six with water. The results are indicated in Tables 1 and 2.

Since the weight of the full strength chemical solution is 12 pounds per gallon and the weight of water at 60 degrees F. is 8.36 pounds per gallon, it is obvious that an average of 0.66 gallons of chemical solution was necessary to extinguish one chain of fire line as against an average of 1.27 gallons of water. Further, by using the chemi-

TABLE 1

TESTS WITH FULL STRENGTH[1] CHEMICAL SOLUTION

Test number	Time required to extinguish 1 chain of fire line	Pounds of water applied	Wind[2] velocity miles per hour
1	1 min. 30 sec.	9.2	12
2	1 min. 13 sec.	9.3	10
3	0 min. 32 sec.	6.9	12
4	1 min. 6 sec.	11.8	10
5	0 min. 33 sec.	5.2	12
6	0 min. 27 sec.	5.0	12
Averages	0 min. 53 sec.	7.9	11.3

TABLE 2

TESTS WITH WATER

Test number	Time required to extinguish 1 chain of fire line	Pounds of water applied	Wind[2] velocity miles per hour
1a	2 min. 26 sec.	11.1	10
2a	2 min. 35 sec.	12.8	13
3a	0 min. 42 sec.	9.0	12
4a	1 min. 24 sec.	12.6	14
5a	0 min. 37 sec.	8.2	13
6a	0 min. 57 sec.	10.1	10
Averages	1 min. 21 sec.	10.6	12.0

[1] Full strength chemical solution is here considered as a solution composed of equal parts (by volume) of dry chemical and water. When K_2CO_3—$2H_2O$ is used this is equivalent to 6.4 pounds of chemical to one gallon of water.

[2] Record taken at station of U. S. Weather Bureau, Columbus, Ohio.

cal, the average time required to extinguish one chain of fire line was 53 seconds as compared to 1 minute and 27 seconds for water. Expressed as a percentage, the time required to extinguish one chain of fire line was 58.5 per cent of that required to extinguish an equal distance by water. On a volume basis, the quantity of chemical required was 52 per cent of the amount of water necessary.

Although these results show the chemical to have considerable advantages over water in extinguishing fire, they do not tell the entire story. The deadening effect of the chemical was in striking contrast to the action of the water. On practically every fire line apparently extinguished by water, a number of "flash backs" would occur a minute or two after the pump man called "time." This would necessitate going over the line again. Flash backs did not appear on those lines extinguished by the chemical.

Another test was made, in a different way, in another set of experiments at Columbus, Ohio, to find out more about the deadening effect of the chemical. A small plot was laid out and a strip 2.5 to 3 feet wide was sprayed with the chemical. It was allowed to remain over night, with the intention of determining whether it would stop a fire on the following day. However, at noon of the next day 0.16 inches of rain fell in about an hour. After this rain the weather cleared and the grass dried rapidly in

FIG. 1.—The plot in the foreground indicates the effectiveness of the full-strength chemical solution, 1.25 gallons of which were sprayed on a three-foot wide strip between the furrows. The sprayed fire line appears as a dark streak. Fire burned up to it and stopped. In the plot beyond, 2.75 gallons of water were used to wet down a fire line marked by the white stake and the man. Fire burned completely over it.

the sun and wind. At about 4:00 P. M. conditions seemed favorable for burning. A fire was set on the upwind side of the plot and allowed to burn toward the sprayed line. The fire progressed rapidly to this line, where it stopped abruptly and did not cross at any point. This was the only test attempted on the second day. On the third day of the tests two chains of "liquid" fire line were laid down. One chain of this line was sprayed with 1.25 gallons of chemical and the other with 2.75 gallons of water. At the end of 45 minutes fires were set upwind from the lines. The fire stopped abruptly upon reaching the chemical line, while a clean burn resulted over the entire length of the line treated with water. This points to the possibility of backfiring from a quickly constructed fire line of this character.

The extinguishing of flames by water solutions of salts involves an entirely different principle than that underlying the treatment of fuels to retard combustion after drying. A chemical suitable for use in one of these methods may be useless or harmful for the other. The chemical used in these tests apparently combined properties that, to a certain extent, made it useful for both types of treatment.

It was the general opinion of observers at the first 12 test fires that more of the chemical was being applied than was necessary to extinguish the fire. This was largely due to the mechanical structure of the pumps, which allowed only a limited control over the amount of liquid expelled. In view of this fact, it was decided to test the chemical when diluted to half strength. Unfortunately, by this time, most of the available area had been burned so that only five more tests could be made. Three fires were extinguished with the chemical at half strength, and two with water. These tests could not be considered comparable with the first twelve, since they were made after 4:45 P. M. and conditions for burning were not as good as during the earlier part of the day. However, the results of these tests were much the same as those of the first 12, indicating that at half strength the chemical was still nearly twice as effective as water.

Throughout all of these tests a special horizontal fan-spray nozzle was used. This nozzle was constructed from a piece of tin about 2 inches wide and 3 inches long, with a half-inch hole cut in the center of the narrow dimension and about three-fourths of an inch from one end. The ordinary stream nozzle of the pump was unscrewed, and the threaded end of the tube to which it was attached was inserted into the hole in the tin strip. The nozzle was then screwed back into place, holding the piece of tin firmly in place. The long end of the tin was then bent forward and down over the front of the nozzle, so that the stream of water, or chemical, issuing from the pump impinged upon its edge about a half-inch in front and was thrown forward in a fan-shaped horizontal spray. The amount of liquid expelled from the pump was thus spread over a greater horizontal distance. In two of the first 12 tests it was found that water so diffused was not sufficient to extinguish the flames in certain spots when applied from the distance at which it was necessary to work. On these occasions the tin flap was merely bent up a short distance, and the water ap-

plied in a stream, until the critical part of the fire line had been cooled down to a point where it could be approached close enough to use the fan spray, which was then adjusted with the thumb of the pump hand.

All weather data were taken from records of the U. S. Weather Bureau at Columbus, Ohio. It will be noted from Tables 1 and 2 that the average wind velocity during these tests was approximately the same for both sets of fires. Temperatures ranged from 73 degrees to 80 degrees F., and the relative humidity varied between 50 and 59 per cent.

In conclusion, it can be stated that the tests described in the foregoing pages show some promise, at least for light fuels such as grass and weeds, and probably also for hardwood leaf litter. The entire field of forest fire suppression by means of chemical extinguishers has not yet been thoroughly explored. Further investigation appears warranted to ascertain how far chemicals might be used, the type of fuels to which they are suited, and the conditions under which they might become effective. The present tests were essentially made on only one type of fuel and under fairly uniform conditions. Information upon chemical treatments under a greater variety of conditions is needed.

IS SILVICULTURE POSSIBLE IN AMERICA?

By WARD SHEPARD

Article II—Men and Trees

Rapid advance in silviculture depends on the skill developed by foresters in dealing with the human rather than the physical obstacles to forestry. Many of the reasons offered against silvicultural logging are, the author believes, unrealistic and untested assumptions. Leaving silvicultural progress to a slow and impersonal "economic evolution" is classed by him as naive and out-of-date economics. He proposes, instead, direct dealing with forest owners to remedy destructive exploitation, partly through strengthening of all educational and research agencies, partly through organized control of exploitation, similar to proposed control of production.

AN UNJUSTIFIABLE skepticism concerning the importance of forests has for the moment diverted the forestry movement from its main task of developing the strategy of victory. This skepticism has grown out of the declining lumber consumption. Yet, when rightly understood, the decreasing use of lumber gives no sound reason for any let-up in the fifty-year drive of foresters to perpetuate forests as sources of timber as well as of many other values. Once we get rid of this skepticism, we can concentrate all the more energy on the methods by which the practice of silviculture may be more rapidly developed.

I showed in the previous article[1] that the recent survey of wood-using industries by the U. S. Forest Service and the U. S. Census Bureau indicates that the decline in lumber consumption has been chiefly in high grade lumber for remanufacture by the wood-using industries of the Eastern United States. This survey forces the conclusion that the decline has been largely caused by depletion and deterioration of the Eastern forests and the consequent destruction of eastern wood-remanufacturing industries, one of the best markets for lumber. These industries—many of them small—could not easily survive the disappearance of accustomed local supplies and the difficulties and costs of obtaining lumber from across the continent. The annual freight bill of over $400,000,000 on lumber, largely occasioned by local deforestation, has been an incalculable but highly important factor in reducing consumption and in permitting the competition of substitutes.

This survey punctures the speculations that have been current of late as to the unimportance of forests, and shows that silviculture is needed not only to save the forests, but to save the forest industries, the markets for forest products, and the ancient position of wood as the universal and preferred material. The skill, the courage, and the faith of the forestry profession therefore remain, as always, determining factors in answering a question of immense importance to mankind: "Shall forests be maintained as an obvious and

[1] Journal of Forestry, December, 1930.

indisputable social good, or shall they be destroyed through industrial and political incompetence?"

The answer to this question depends primarily on the quality of national statesmanship evoked to deal with the forest problem; and this in turn largely hinges on the skill developed by foresters in overcoming the human obstacles to forestry. For, let it be repeated, our great immediate problem is not trees, but men; not the abstract art of silviculture, but the art of modifying human behavior toward the forest. If given methods fail to reach a reasonable goal, either the method is weak or the materials are intractable.

We have, let us frankly admit, failed to reach the goal of silviculture in private forests, either through voluntary acceptance by forest owners or through social control of forest exploitation. In spite of admirable and skillful examples of private forestry, no one any longer has the illusion that private forestry has made or is making headway that would entitle it to rank in extent as a sufficient contribution to the solution of the forest problem. It may be 2 per cent or 6 per cent of private forests, but it emphatically is not the 25 per cent or 50 per cent that fair success after fifty years of forestry effort, would require from the standpoint of the public interest.

Now in promoting silviculture in private forests, we are dealing with two great sets of materials or forces: The men who own and operate the forests and the economic conditions that define the limits in which these owners can profitably act. Failure to get forest owners to accept silviculture, therefore, means either that the economic conditions prohibit action, that the owners are intractable, or that our methods of dealing with them are inadequate.

To discuss whether man is tractable or intractable would take us too far afield, and we should find opinion varying from the absolute fatalism of the etreme determinist to the equally extreme "behaviorist's" belief in the entire plasticity of the human personality. Regardless of psychological theory, commonsense and experience tell us that man is a contrast of stubbornness and pliability, amenable to change if skillfully appealed to. Recent history is full of startling changes in human behavior —the Russian revolution, for example, the universal use of the automobile, the development of installment buying, to cite diverse examples. Back of all such changes there is, to a greater or less degree, skillful methodology in dealing with men. We can safely accept the premise that man is a reasonably satisfactory animal to deal with if we find the right key to his curiosity, interest, and creative power.

Do present economic conditions, then, prohibit this reasonably pliable creature from at least experimenting with silviculture? In general, the tendency has been to accept the dictum that they do. Yet if we closely examine the alleged reasons why better methods of handling forests are impossible in America, we are forced to the conclusion that many of them are not "reasons" but come from that quaint habit of the human mind known to psychologists as "rationalization." To rationalize means to find a seemingly logical reason for an irrational or untenable action. Someone has even gone so far as to say that everyone

has two reasons for everything he does—the real reason and the reason he gives. Be that as it may, the trickiest thing about this process of rationalizing is that it tricks even the rationalizer. For essentially it is a defensive mechanism—it gives a seemingly respectable reason for unsatisfactory deeds.

Now, confronted with the shocking facts of deforestation on a continental and ever-increasing scale, it was inevitable that "reasons" for so disastrous and anti-social a process must be created even if they didn't exist. For many years many people have been rationalizing forest destruction. In fact, it might be said that at the present moment our forests are being rationalized out of existence. The lumber industry, without having made an effort to change logging methods so as to assure reforestation, without having made any systematic inquiry into the feasibility of better forest practices, has been peculiarly prolific in reasons for inaction. And I am afraid that we as foresters have spent more effort in explaining why private forestry is impractical than in realistic investigations of its practical economic possibilities and limitations.

The policy of inaction toward remedying the direct causes of forest devastation (*i. e.*, destructive logging methods) has been supported by many uncritical and untested assumptions that still pass current as sound reason. It is often said, for example, that Douglas fir has made forestry unprofitable in the East, when in fact it is unprofitable because of the degraded condition of the Eastern forests, which has made their low grade products often unsalable. Even more familiar and more often repeated are the assertions that silviculture cannot be practiced so long as taxes remain as they are, or while West Coast overproduction exists, or while lumber prices are so low. These assertions are usually made with an air of authoritative finality, whereas in fact there is little exact evidence on the costs of improved logging methods and consequently no surety that given steps are unfeasible even under present handicaps. On the contrary, wherever exact study has been made of selective cutting for example, it has proved that cutting small timber is usually done at a loss; and where silviculture is being practiced, *e. g.*, Keene and Petersham and Bates, and numerous large and small private holdings, the practitioners seem to agree that they could not afford *not* to practice it. On the West Coast there is a sound and conservative body of expert opinion that believes that so-called "economic selective logging" (*i. e.*, cutting the high grade accessible blocks of stumpage and leaving for a later cutting the low grade or less accessible blocks) would not only be more profitable than clear cutting, but would materially assist in solving the problem of overproduction, while at the same time permitting the regeneration of the Douglas fir forest.

In thinking of the "costs" of forestry it is too often the case that the immediate cost of a given step is put on the debit side without considering indirect or hidden savings and benefits, so that in effect we throw the case out of court without a hearing. These "offsets" to direct costs need to be more thoroughly investigated and more carefully weighed. There is, for example, the immensely important item of reduced amortization

charges on plant and improvements. It has been found that slash disposal often more than pays for itself in preventing the loss of logs under scattered slash or in reducing the costs of protection. One of the most experienced private foresters in this country has told me that forestry has raised the whole "tone" of the woods operations of his company. It has, for instance, given an exact inventory of timber and topography, so that logging "chances" and camps and roads can be accurately and quickly located with great savings; whereas in the old days of "practical" men,[2] costly errors of location were common. It is the opinion of this forester that forestry has cost his company nothing, and in fact has permitted it to produce more wood at less cost.

A striking example of how logging methods may be rapidly changed is in the substitution of tractor logging for overhead skidding. It has been purely for logging economy that tractors have so far displaced overhead logging in private forests in parts of the West. Now it happens that tractor logging is much better for the forest than overhead logging; and my point is that with a systematic set-up to promote "reproductive logging," this substitution could and would have been introduced as a means to silviculture. The realism of forestry will be further tested by the skill used in modifying the handling of tractors to prevent excessive trampling of reproduction.

For all these "alibis of inaction" it can be said that the basis is shaky and uncritical, being largely unsupported by quantitative evidence or even by casual "cut-and-try" experiments. Most of them are hoary with antiquity and shiny from constant use. Among their addicts, they trip easily off the tongue; and being automatic and applicable to any situation, they prevent the fatigue of thought. I therefore propose a ten year moratorium for all excuses, alibis, and apologies for destructive cutting, and the substitution of a critical curiosity to obtain the facts before pronouncing a death-sentence on the forest.

The natural corollary of the economic alibi for forest destruction is the belief that gradual economic evolution is the principal remedy for forest destruction. This economic fatalism has made two main assumptions;—first, that by and large only a long drawn out evolution would remedy forest destruction by making forestry profitable; and second, that when profitable forestry is possible, it will automatically be adopted. These assumptions are impressive but untrue. They are untrue because many improved practices can be profitably put into effect immediately, and because the technique of forestry will not be automatically adopted because it is too unknown and too complex to be accepted without an arduous process of training of all the men responsible for or engaged in woods work.

The oblique and indirect method of attack through improving the economic incentives for forestry (important as that improvement is) can no longer pass muster as the principal basis for an adequate national program of forestry. Until we have a thoroughly organized,

[2] The "practical" man has been defined as one who goes on repeating the mistakes of his ancestors.

direct effort to improve cutting and logging methods, we are neglecting the obvious and immediate opportunity for silvicultural reform and ignoring the customary and rational way to human action. It is as if, in the campaign against tuberculosis, the chief emphasis should be placed on the laudable but indirect remedies of increasing the supply of cod-liver oil and promoting eugenic marriages, but should fail to control direct infection or treat the disease itself.

This indirection of attack gives to the forestry movement a doctrinaire and unrealistic basis. More than all other causes combined, it is responsible for the showing of the movement and the failure to get adequate public and legislative support. It has vitiated our public discussions of forestry, has promoted evasion of the main issue, and has incalculably weakened forestry education. Until we scrap the whole *laissez-faire* policy and subsititute a policy of direct, realistic, and rational control of forest destruction, we shall continue to give a tacit approval of forest devastation and to promote a progressive weakening of the forestry movement. The world is alive with experiments for the dynamic control of the great economic forces and processes; the lumber industry itself has petitioned the Government of the United States for permission to control lumber production under government supervision; but much current forestry thought still leans on the naive and primitive economics of the eighteenth century, and defends an extreme and destructive individualism that would nav made even Adam Smith hesitate.

The inert doctrine of *laissez-faire* has fifty years demonstrated its fatuity and futility in an ever-increasing crescendo of cumulative forest destruction. Let us therefore scrap it as a possible clue to action, together with skepticism toward future forest needs and apologies for forest destruction, and let us substitute the principle of rational and purposive control through a positive and direct attack on *the specific processes of forest destruction.*

The key to remedying the processes of forest destruction is through strengthening our methods of dealing with men —i.e., forest owners. The inadequacy of these methods is proved not merely by the general absence of silviculture in private forests, but by the indisputable fact that only an insignificant fraction of forest owners and of woodworkers, woods foremen, managers, higher executives, and directors have the faintest conception of the methods of silviculture, or of feasible modifications of cutting methods (such as selective logging) to assure reproduction.

If we analyze the chief instrumentalities available for dealing with these problems, we find that with minor exceptions, it is only in farm forestry that there is organized effort ("extension") to reach timberland owners. On some 200 million acres of commercial timberland, aside from the admirable efforts of a few consulting foresters, no systematic effort is being made to devise improved cutting methods, though these holdings offer by far the best opportunity for organized reforms.

Ocular demonstration in silviculture is essential to the millions of forest owners to whom silviculture is a *terra incognita;* but we have only a handful

of demonstration forests consciously organized for reaching and teaching these owners.

Research, which is making such vigorous progress in all branches of forestry, and especially in the more scientific phases of silviculture, is not yet fully developed to deal with the rough-and-tumble of actual woods operations *to work out with the management feasible modifications of logging.* Notable exceptions are such projects as selective logging and the "minimum requirements" studies by the Forest Service. This type of research, however, is particularly appropriate for industry to undertake, and its lack of development is partly due to lack of industrial interest in forestry.

Finally, at the very root of the problem, forest education is not yet adequately training men to deal most effectively with the transition from traditional logging to elementary silviculture, and to grasp and analyze the current industrial and economic problems faced by forest owners and industries, as a means of modifying the policies of the management in the handling of forest properties.

Thus, as we analyze these approaches, we find that each needs to give more emphasis to the educational functions of forestry (i.e., the art of dealing with men), and the need to develop it fully as a separate technology, entirely distinct from silvicutlture.

In order to take advantage of the great opportunities for improving woods practices, we must therefore more fully develop the instrumentalities for dealing with men. Partly it is a problem of intensifying and to a certain extent redirecting existing agencies looking to the voluntary adoption of forestry methods by individual forest owners. Partly and principally it is a question of creating effective instrumentalities for the organized control of forest exploitation and forest production, so that the forests of America may be saved from their twin enemies, over-cutting and over-production.

These two phases of the subject will be dealt with in the final two articles.[3]

[3] Part III will appear in the March issue. *Ed.*

FRENCH FACE EXPERIMENTS IN TURPENTINING

By V. L. HARPER

Assistant Silviculturist, Southern Forest Experiment Station, Starke, Florida

Now that the American naval stores industry must derive its raw material from relatively small second-growth trees, it finds the traditional methods of chipping the large old-growth trees unsatisfactory. The author describes experiments on the application of the French system of chipping. The results over a two-year period indicate some superiority of the French system over that of the American for small trees particularly as to the yield of gum and the rate of healing the wounds.

IN THE method of turpentining that has made the Landes region of France famous for its continuous production of naval stores and wood products, a type of "face," or wound for obtaining the crude gum, is made that differs from the type used in the American industry. The difference is in width of face and method of chipping. A French face is from 2 to 4 inches wide whereas an American face may be from 6 to 14 inches wide. A French face is arched at the top; an American face has an inverted peak. The freshened surface, after a French face is chipped, is 5 to 7 inches long; has its deepest point at the bottom of the freshened surface and center of the face, and gradually tapers to a feather edge outward to the sides and upward to the top. An American face is chipped with a streak approximately one-half inch high by one-half inch deep across the top from the sides inward and downward to a peak. Each type of face progresses up the tree approximately one-half inch at a chipping but the American face is chipped only in uncut wood whereas the French face is chipped one-half inch in uncut wood and 5 inches in the old wound.

These widely different types of faces no doubt are due largely to the conditions under which the American and French turpentining industries started. In America the industry dates back to colonial times and from then until recently turpentining was done on large, virgin pine trees. There was no necessity for long-time operations, for sawmills were eagerly on the heels of turpentine stills. The development of turpentining in France had its main stimulus during the Civil War when the blockading of the southern ports of the United States cut off the world's supply of naval stores. Having no vast areas of virgin pine it was necessary for the French to develop a system of turpentining in harmony with the growing of wood products, including lumber. This they have done with signal success for their turpentine orchards are managed for long sustained production.

Now that the American operator must practice his turpentining on young, second-growth trees it is natural that he, too, should be looking for a method that will permit growing the trees to sawmill size. It is not probable that he can adopt the French system in its entirety because of different economic conditions but some modification may be possible.

It was with this latter thought in mind that the Southern Forest Experiment Station included French face experiments in its general study of methods of turpentining that do minimum damage to the tree and increase its working life.

In 1915 the U. S. Forest Service established tests with the French face method of chipping on the Florida National Forest (6). Gum yields from wide and narrow French faces were compared with yields from American faces over a 6-year period. Computed on a square inch basis the American chipping yielded a little more gum than the French.

Other attempts to use the French face on a semi-experimental scale have been made by a few naval stores operators but with no great success. The chief difficulty seems to have been in getting the work properly done by American labor with French tools. Also, the low yield of the regular narrow French face made it doubtful whether one face per tree would pay expenses with the labor costs prevalent in the American industry.

To obtain more accurate data on the yields of French faces a small experiment was started in 1928 on the Kingsley experimental area in Clay county, 6 miles east of Starke, Florida. On 50 young thrifty longleaf pines from 9 to 12 inches in diameter at breast height, a French face 5 inches wide was placed on one side of each tree and an American face of equal width on the opposite side. Each face was chipped weekly and the chipping on both types progressed up the tree at the rate of one-half inch to a chipping.

During the first year of 32 streaks put on from March to November the French faces yielded 22 per cent more gum than the American faces and during the second year's work of 32 streaks the French faces yielded 16 per cent more gum. The same faces are being chipped the third year but these records are not yet available.

The greater yield of the French faces during the first year can be explained in part by the fact that the French faces were chipped about three-quarter inch deep whereas the American faces were chipped only one-half inch deep. Also, the French faces averaged 6 inches longer than the American, a difference that was unavoidable because the first streaks left the French face 6 to 7 inches long and the American only one-half inch long. Subsequent streaks progressed up the tree only one-half inch for each type of face but of course the French face chipping overlapped the old wound each time by 5 inches. This overlapping of the French face chipping may be responsible for part of the greater yield, for during the second year's work the surface area of each face was very nearly the same.

Whether greater yields could result by re-opening the horizontal resin ducts over a considerable area in French face chipping as contrasted to the small area of the American streak would depend upon the effective drainage of the vertical and horizontal resin ducts into each other. Microscopical work (5) has shown that radial ducts are frequently fused with vertical ducts and European investigators have demonstrated that vertical ducts can be drained by cutting the radial ones.

In 1929 an experiment with French

FIG. 1. The regular American face. (*U. S. Forest Service photo No. 226689.*)

FIG. 2. Two 3.5-inch French faces arranged to drain into one cup on a slash pine tree 9 inch, d. b. h. Faces have just been chipped giving the outline of the streak a clearer definition. (*U. S. Forest Service photo No. 234956.*)

faces was started on second-growth slash pine in Bradford county near Starke, Florida. One of the objects of this second experiment was to compare the gum yield from normally wide American faces with two or more French faces totaling the same amount of wounding. For this purpose three well matched groups of about 50 trees each were selected. French faces were used on two groups and regular American faces on the third. The trees ranged from 9 to 17 inches in diameter at breast height, averaged 11.7 inches d. b. h., 75 feet in height and were 40 years old in 1929 at the time the experiment began. All trees had been previously turpentined, so are classed as back-face timber.

Each French face was made 3.5 inches wide and 2, 3 or 4 faces placed on a tree depending on its size. The aim was to cut as much surface in French faces as would have been cut had the regular, single American face been used. A 3.5 inch bark bar was left between the French faces, which were so arranged that one cup collected the gum from as many as 3 faces. Where 4 faces were used they were arranged in pairs, each pair to drain into one cup. Chipping on each type of face was one-half inch deep and progressed up the tree one-half inch to a streak; the gum was dipped and weighed from both the French and American faces about once a month and the hardened gum on the faces was scraped off and weighed at the end of the year. The yields of crude gum per tree and the calculated yields of turpentine and rosin per 10,000 trees are given in Table I. The turpentine yield of the two groups of French faces exceeded the American by 23 per cent and 25 per cent respectively.

In the spring of the same year, 1929, 69 round slash pine trees were faced by the French method to supplement the back-face timber in a study of the relation of tree size to yield. These trees were 15 to 20 years younger than the back-face trees and ranged in diameter at breast height from 5.1 to 9.0 inches. One 3.5-inch-wide face was put on trees 5.1 to 7.5 inches, and 2 on trees 7.6 to

Table 1

NAVAL STORES YIELDS FROM FRENCH AND AMERICAN FACES

Second Growth, 1st-year Back Faces, Slash Pine, Bradford county, Florida. 32 Streaks—1929

Type of face	Trees	Average d. b. h.	Average width of exposed face per tree	Average gum yield per tree		Naval stores yield from * 10,000 trees			
				Dip	Scrape	Turpentine	Increase over American faces	Rosin	Increase over American faces
	Number	*Inches*	*Inches*	*Ounces*	*Ounces*	*50 gallon barrels*	*Per cent*	*420 lb. barrels net*	*Per cent*
French	50	11.8	9.0	156	6	55.2	23	177.6	19
French	47	11.7	9.2	158	7	56.2	25	181.4	21
American	43	11.6	10.3	123	12	44.8	...	149.5	....

* Converting factors, Bureau of Chemistry and Soils analyses: Dip—20.1 per cent turpentine; 73.4 per cent rosin; 6.5 per cent trash and water. Scrape—8.8 per cent turpentine; 86.3 per cent rosin; 4.9 per cent trash and water.

9.0 inches. Table 2 shows the average size of the 1-, 2-, 3- and 4-face trees and gives their corresponding gum yields per face.

It is noteworthy that the yield per face is higher for big trees than it is for small ones. Forty-six trees averaging 6.4 inches d. b. h. with one face each yielded 50 ounces of gum per face whereas 33 trees averaging 12.5 inches d. b. h. with 3 faces each yielded 63 ounces of gum for each face. This is of importance to turpentining because it not only shows that small trees are small producers but shows that by turpentining larger trees more faces are possible and more gum is obtained per unit of chipped surface. Buffault (1), working with maritime pine in the Landes region, France found that the yield per face for trees of 12 inches d. b. h. was cut down slightly when two or more faces per tree were used.

It is doubtful if the practice of hanging but one French face to a tree would be profitable under the present economic conditions in the naval stores industry. Table 2 shows that the yield from a single 3.5-inch-wide face is only 23 barrels for large trees. It is frequently said by commercial operators that a yield of approximately 35 barrels per crop must be obtained in order to equal the cost of production. Extra high prices for turpentine and rosin would make a lower yield profitable but it is doubtful if an operator could ever afford to work timber yielding only from 17 to 23 barrels.

Two French faces per tree on round timber averaging 8.1 inches d. b. h. yielded 38.4 barrels of turpentine per crop (using 10,000 trees as a crop). The back-face trees, although a little larger, showed very nearly the same 17 barrels of turpentine per "crop" (10,000 faces) for small trees, and possibly yield rate for 2 faces. Using the same arbitrary yield limit of 35 barrels, two French faces per tree are profitable to work.

More than 2 French faces to a tree gives a greater yield per tree and should have a place in the management plan for the turpentine forest. If the trees are to be cut in a few years all the faces that the tree can support should be worked immediately. This applies to

TABLE 2

GUM YIELD PER FACE FROM 1-, 2-, 3- AND 4-FACE TREES

Second Growth Slash Pine, Bradford county, Florida. 1st-year working, 32 streaks. 1929

Class of trees	Trees	Faces per tree	Average measurements				Total gum yield per face	Turpentine yield per 10,000 trees
			D. B. H.	Height	Crown Width	Crown length		
	Number	*Number*	*Inches*	*Feet*	*Feet*	*Feet*	*Ounces*	*50-gal. barrels*
Round	46	1	6.4	54	7	16	50	17.1
Round	23	2	8.1	65	8	17	56	38.4
Backface	29	2	10.4	73	9	19	57	39.0
Backface	33	3	12.5	76	12	22	63	64.6
Backface	4	4	15.8	78	18	28	67	91.5

trees to be removed in thinning and to trees ready for the saw-mill. This method of close cupping is called "tapping to death" by the French. For the rest of the stand the French practice is to vary the number of faces according to the size of the tree and its rate of growth. They are interested in a long working life for the tree, a period that frequently begins when the tree is 25 years old and goes on more or less continuously until it is from 70 to 75 years of age, when it is cut for lumber (2, 3).

One of the obstacles to the use of the French face in this country has been the difficulty in getting the chipping done properly and fast enough to compare favorably in cost with that of the American face. Most of the attempts have been made with the regular French hack, which has a narrow cutting edge and requires considerable time and skill to make a smooth face.

During the second year of the experiment the writer designed a special tool for chipping the French faces similar in principle to some of the American-face tools. This tool is now being used its second year and has proved much faster for chipping than the French tool.

To determine the relative time required for chipping French and American faces the chipper was timed on 1, 2 and 3 French faces to a tree and on single American faces to a tree. In the case of the French faces the total time at the tree was used, that is, actual chipping plus shifting from one face to the other where more than 1 face was employed. Table 3 shows the average time taken to chip the French and American faces during the second year's working:

TABLE 3

COMPARATIVE CHIPPING TIME

French faces	Number of trees	Total time at tree
		seconds
1-face tree	46	2.89
2-face trees	59	9.22
3-face trees	46	15.70
American faces		
1 wide face	42	8.00

This shows that there is very little difference in time required to chip 2 French faces on a tree or one American face.

Using the actual chipping time of the two types of faces as a criterion of what could be expected of a chipper, and more important to the turpentine operator, what rate of pay will be required, should not be given too much weight. Other factors, such as number of trees per acre and speed with which the chipper walks from tree to tree, have a large influence on the amount of work a chipper can accomplish in one week. It is common practice to pay a certain amount per thousand faces for chipping regardless of density of stand. The average chipper handles 6000 American faces per week in the usual scattered stand of 20 faces per acre where he devotes about 25 per cent of his time to actual chipping and the balance of his time to walking from tree to tree. If the same chipper is moved to a "drift" containing 200 trees per acre his actual chipping time is 40 per cent (by actual timing on a one-acre plot) and he could, with the same rate of speed, chip 3600 faces more in a week or a total of 9600 faces. In this same average drift of 6000 faces it would take the chipper only 2 hours longer to chip a double French face instead of the single American face. Thus, while for a given stand

of timber the double French faces require more time to chip than an American face, the rate of pay for a chipper might conceivably be more influenced by varying densities of stand. If Jones pays $1.00 per thousand faces for chipping according to the American style, Smith should pay a little more for chipping French faces only if his number of trees per acre is the same or under Jones'.

The experiment has not progressed far enough to determine the rate of face healing. From a theoretical standpoint the double or triple French faces on a tree should heal at a faster rate per inch of total face width than the single American face. Assuming the rate of healing for each face to be one-half inch per year, as is indicated from observation, the French faces would all be grown over in 7 years, whereas the American face would have closed to the extent of only 3.5 inches. The rapid healing of the narrow faces is an important point in French turpentining management.

On the basis of these preliminary tests it is believed that the French system of turpentining has much to recommend it to operators working in second-growth timber. Certainly more experimental work is warranted on the basis of the success already obtained. It has been demonstrated that French faces can be chipped at a rate that compares favorably with American faces, and enough work has been done in hanging cups and gutters to indicate the feasibility as well as the practicability of the French-face method.

A large share of the success of the French system is no doubt due to the narrow faces. Not only is the yield greater per share unit of surface as compared to the wider American face but two or more narrow faces on a tree will heal faster because of the living bark bars separating them. It might be argued that narrow faces made with the regular American hacks would accomplish the same thing. Perhaps it would if it were practicable to make them. Experience with the so-called split face, which is the regular American face separated in the midle by a bark bar, has shown that it is extremely difficult to keep chippers from chipping through the bark bar in their free hand stroke of the hack from outside shoulder to bark bar.

Summary

1. The French face is much narrower than the traditional American face. In chipping a French face a surface freshened is from 5 to 7 inches long and as wide as the face whereas the American face has a streak about one-half inch high and one-half inch deep cut across the top of the face. The faces lengthen or progress up the tree at approximately the same rate.

2. Previous trials with the French face in this country have not been very successful for 2 main reasons: difficulty in getting the work done with French tools and the small yield from such a narrow face.

3. On young longleaf pine, 5-inch French faces yielded 22 per cent more gum than 5-inch American faces for the first year. For the second year the French exceeded the American by 16 per cent.

4. Three well-matched, young, slash pine groups of 50 trees each were selected and 2 groups were turpentined with French faces and 1 group with the regular American faces. The total amount of wounding was the same for all three groups. Results for the first year of working showed one group of French faces to be yielding 23 per cent more turpentine than the American faces. The other French-face group yielded 25 per cent more than the American.

5. Another experiment with slash pine showed that the gum yield per French face increased with the size of tree.

6. One French face per tree does not yield enough to pay for its working under present cost of production.

7. The regular French hack proved too slow for chipping French faces. A new tool, similar in principle to the American hack, was developed and proved satisfactory. Two French faces can be chipped in approximately the same time as one American face.

8. The time required to heal a tree turpentined with French faces is shorter than the time required for the wider American face. Two French faces separated by a bar of bark have four healing surfaces whereas the American face has only two.

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A TEST OF HYPSOMETERS ON SHORT TREES[1]

By H. F. MOREY

Junior Forester, Allegheny Forest Experiment Station

Various studies have been made of the relative advantages of the different hypsometers in common use. The test here described is on the Abney level and the Klaussner, Faustmann and Forest Service hypsometers to determine their relative advantages. It shows the advantage to lie between the Forest Service hypsometer and the Abney level; the Abney level seems to be more accurate and the Forest Service hypsometer somewhat quicker; the Abney level, being more of a general purpose instrument, has, on the whole, the advantage.

WHILE establishing some permanent sample plots in oak stands in southern New Jersey, a field party from the Allegheny Forest Experiment Station made a test of the Abney hand level, and the Klaussner, Faustmann, and Forest Service hypsometers. The purpose of this test was to determine the relative advantages of each instrument.

A hypsometer must be not only accurate within prescribed limits but should also be portable, rugged, and rapid to operate. For most practical purposes, accuracy to within one foot is sufficient. In volume tables, heights are ordinarily given in number of 8 or 16-foot logs or by 10-foot total-height classes. A difference of one foot in the total height of a 10-inch white oak between 50 and 60 feet high would mean an error of two-tenths of a cubic foot, or slightly more than one per cent (3). This is accurate enough for cruising work. For growth measurements, however, an accuracy to within one-half foot is sometimes desirable.

It is well to recall the known advantages and disadvantages of the various instruments used in this test.

The Klaussner has two advantages. It does not tire the operator as quickly as the other hypsometers, and computations for fractional distances of 100 feet are eliminated because the scale is adjusted for each distance. On the other hand it is often more difficult to locate the bases and tips of the trees in a dense or brushy stand with a tripod or staff hypsometer than with an instrument that is held in the hand. This sometimes necessitates making several time-consuming set-ups before the tip of the tree can be located. On steep slopes, where several measurements of the same tree must be made for the sake of accuracy much time is consumed with a Klaussner. One is consequently tempted to guess at the tip or base of the tree when it is partially hidden; with a more mobile hypsometer the observer can move about to better advantage and make sure of his objects. The arms of the Klaussner are very easily bent, which decreases its accuracy. These features alone make it very undesirable for general field work. More rugged design, such as was recommended by Noyes (4) would probably prevent the bending of the arms.

[1] Acknowledgment is due to Assistant Silviculturist G. L. Schnur of the Allegheny Forest Experiment Station who helped plan this test.

The Faustmann shares an advantage with the Klaussner: heights can be read directly from the scale at any distance, thus eliminating reductions for measurements taken at fractional distances of 100 feet. Its great disadvantage is the difficulty of keeping the plumb bob from swaying during a windy period, which makes it difficult to obtain accurate readings. Many of its parts are fragile.

The Forest Service hypsometer is very portable, built to withstand rough usage, and has been used to some extent for determining the grades of roads and trails. The small aperture and five-foot instead of one-foot graduations make it somewhat difficult for the inexperienced man to read. Sometimes when the indicator is slightly to one side of a five-foot mark, a question arises as to whether the unit is a 4 or a 6. A little practice, however, eliminates this doubt. Graduations at 2.5-foot intervals, such as is recommended by Krauch (2) might facilitate interpolation. Reductions have to be made for base distances other than 100 feet.

The Abney hand level is very portable and rugged, and it has a variety of uses such as location of roads and trails, topographic surveying, and leveling. About the only disadvantage of the Abney is that reductions have to be made when heights are taken at distances of other than 66 feet for the topographic limb and 100 feet for the per cent limb.

Although American foresters have formed some idea of the relative accuracy of these hypsometers, a review of the literature reveals very little published material on the subject.

Noyes (4) made a comparative test of the Forest Service and Klaussner hypsometers by measuring markers attached at various heights to a line suspended from a tall tree. The measurements were all made at a distance of 100 feet from the base of the tree. His results showed that the Klaussner was more accurate at this distance than the Forest Service hypsometer. However, the maximum deviation for readings with the latter at heights of 53 feet and under was 0.5 foot, while that for the Klaussner readings was 0.8 foot. For heights from 53 to 103 feet, the errors of the Forest Service hypsometer increased with the increase in height, while there was no relationship between inaccuracy and height with the Klaussner. The Klaussner read low on trees higher than 75 feet, about correct on trees from 75 to 60 feet in height, and high on trees below 60 feet. The Forest Service hypsometer read consistently low on all heights. The time required to measure 25 trees was recorded for each instrument. The Forest Service hypsometer was more rapid, requiring only 72 per cent of the time required by the Klaussner.

Barrett (1) made a test of the Forest Service hypsometer only. He measured heights on 148 loblolly, shortleaf, and longleaf pines with the hypsometer before the trees were felled, and then measured the heights with a tape after the trees were on the ground. The base lines were 50, 66, and 100 feet, and the heights of the trees ranged from 32 to 114 feet. Reductions were made mentally in cases where base lines other than 100 feet were used.

In writing of the results of this test,

Barrett says, "The standard error of the hypsometer for all heights was found to be 1.325 feet. The average heights of all the trees measured were 60.3 and 60.2 feet for the hypsometer and tape, respectively. It seems that the Forest Service standard hypsometer will give sufficiently accurate results for many uses where slight errors are allowable."

Method of Study

In the present study the stem of a pine on level ground was marked with a band of white paint at the following heights, in feet, above the ground: 4.5, 10.0, 15.0, 17.5, 18.5, 20.0, 23.0, 26.5, 30.0, 32.0, 35.0, 40.0, 46.5, 50.0, and 52.5. Since the maximum height of the trees on the sample plots was 49 feet, and 90 per cent of all heights were under 40 feet, the marked heights were sufficient for the test. A base line was then measured from the tree for a distance of 100 feet, stakes being set at the 10, 20, 30, 33, 40, 50, 60, 66, 70, 80, 90, 99, and 100-foot stations. The Forest Service, Faustmann, and Klaussner (with Jacob staff) hypsometers, and the Abney hand level (per cent, without staff) were tested at each 10-foot station. The Abney hand level (topographic, without staff) was used at the one-half chain, chain, and one and one-half chain stations. Four men used each instrument at every station. The time required for each man to measure the series of heights from a given station was recorded.

The vertical arm of the Klaussner, bent at some previous time, had been straightened before it reached the crew. Deficient straightening may be a cause for the poor showing made with this instrument.

The instruments were sighted on the breast high mark instead of on the ground. Thus 4.5 feet had to be added to the height obtained with the instrument.

Reductions, which were calculated on paper by a tally-man who accompanied the observer, were checked in the office so as to eliminate any errors due to calculation.

The readings for the Forest Service hypsometer could be interpolated only to the nearest foot, those for the other hypsometers were interpolated to the nearest 0.5 foot.

Results

Accuracy: Table 1 shows the standard deviation, average deviation per cent, and aggregate deviation per cent for all instruments. In each case, the Abney level and the Forest Service

Table 1

COMPARISON OF INSTRUMENTS FOR ACCURACY

Instrument	Standard deviation *feet*	Average deviation *per cent*	Aggregate deviation *per cent*
Abney, per cent limb	±.380	.277	—.098
Abney, topographic limb	±.542	.360	+.019
Forest Service	±.643	.458	—.443
Klaussner	±.845	.750	+2.376
Faustmann	±1.413	.960	—1.467

hypsometer are lower than the Faustmann and the Klaussner.

There was no decrease in the degree of accuracy with increase in height for any instrument. Since the maximum height measured was 52.5 feet this corresponds with the results obtained by Noyes (4) for heights of 53 feet and under.

Speed: Since the conditions of the test did not represent the conditions under which the instruments would ordinarily be used, the results of the time study were found to be of little value; a special time test was conducted with the Forest Service hypsometer and the Abney hand level on three sample plots. The results are given in Table 2.

Table 2

COMPARISON OF INSTRUMENTS FOR SPEED

No. of trees measured	Time—minutes	
	Abney, topographic	Forest Service hypsometer
23	45	37
14	33	32
14	36	31

It is obvious that the Forest Service hypsometer is somewhat less time-consuming than the Abney hand level.

Personal factor: It was at first thought that the personal equation might make considerable difference in the accuracy of the measurements and the time required to make them. This was not found to be true in the test. The man who made the greatest number of errors with a given instrument in one series might make the least errors in the next series. One man required more time than the others for one series of measurements, but in the next series less.

Effect of height on accuracy: The height measurements were separated into two groups, those of 30 feet and less, and those above 30 feet. The results for all four men were averaged, making a total of 32 readings for the lower group, and 24 readings for the higher group for each distance.

The distance from the tree at which the greatest accuracy was obtained with each instrument for heights of 30 feet and under is given in Table 3. This separation of the data will be seen not to affect the relative standing of the instruments with respect to accuracy.

Accuracy to within an average of 0.5 foot was obtained for heights of 30 feet and under by using the instruments and distances in Table 4.

Table 5 gives the distance at which maximum accuracy was obtained with each instrument for heights from 30 feet to 52.5 feet.

Table 3

EFFECT OF HEIGHT ON ACCURACY

Instrument	Distance of instrument from tree *feet*	Average deviation *feet*	Maximum deviation *feet*	Per cent of perfect readings
Forest Service	50	0.12	0.5	75.0
Abney, topographic limb	33	0.12	0.5	65.7
Abney, per cent limb	50	0.13	0.5	56.2
Klaussner	80	0.39	0.7	6.2
Faustmann	40	0.49	1.0	37.5

TABLE 4

ACCURACY FOR HEIGHTS OF 30 FEET AND UNDER

Abney topographic	0.5, 1.0, 1.5 chains
Abney, per cent	20, 30, 40, 50, 60, 70, 80, 90, 100 feet
Forest Service hypsometer	20, 40, 50, 60, 70, 80, 90, 100 feet
Klaussner	40, 50 feet
Faustmann	80, 100 feet

TABLE 5

ACCURACY FOR HEIGHT FROM 30 FEET TO 52.5 FEET

Instrument	Distance of instrument from tree *feet*	Average deviation *feet*	Maximum deviation *feet*	Per cent of perfect readings
Abney, topographic limb	66	.16	.8	58.4
Abney, per cent limb	50	.17	.5	58.4
Forest Service	100	.29	1.0	45.8
Faustman	100	.64	2.0	25.0
Klaussner	50	.67	1.5	16.7

Accuracy to within an average of 0.5 foot was obtained for heights between 30 and 52.5 feet by using the following instruments and distances:

Abney, topographic, 1.0 chain.
Abney, per cent, 40, 50, 60, 70, 80, 90, 100 feet.
Forest Service hypsometer, 50, 80, 90, 100 feet.

CONCLUSIONS

The results of this test indicate that for practical purposes, the Forest Service hypsometer and the Abney hand level are sufficiently accurate, for trees having heights of 50 feet and under. Since the Forest Service hypsometer and Abney hand level are rugged in construction, very portable, require a minimum amount of time for manipulation, and have a fair degree of accuracy, they are more desirable for general field work than either the Klaussner or the Faustmann hypsometers.

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MULCHING NURSERY TRANSPLANTS

By T. J. STARKER

Oregon State College, Corvallis, Ore.

The author reports results of trials of various materials for mulching forest nursery transplants. He was particularly interested in paper mulching, but found it not wholly as satisfactory as leaves, where mulching was necessary at all.

NEARLY every one is familiar with the success in Hawaii of the use of a paper mulch on pineapple and sugar-cane fields. Probably less is known of the results of experiments carried on by the U. S. Department of Agriculture in using black paper with certain garden crops. Nothing, as far as the author knows, has been done to date with this form of mulch in connection with forestry nursery practice.

The use of paper as a mulch was first introduced in 1914 by C. F. Echart, manager of the Oloa Sugar Company, Oloa, Hawaii. The purpose was mainly to control the rank weed growth. In 1916 a paper impervious to water was introduced, and today a large percentage of Hawaii's sugar cane and pineapples are grown with a paper mulch. The paper is made of wood pulp, it is very tough and is impregnated with asphalt.

Some of the advantages claimed for the paper mulch are:

1. Soil temperature is increased
   a. By absorbing solar heat and transferring it to the soil.
   b. By checking evaporation of moisture and reducing the cooling action of evaporation.
2. Bacterial activity in the soil is accelerated.
3. It prevents sudden changes in soil temperature.
4. It prevents sudden changes in soil moisture content.
5. It increases penetration of water.
6. It prevents weed growth.
7. It eliminates cultivation during cropping.
8. More moisture is held in the upper layers of the soil where the plant foods and oxygen are most abundant.

Straw has been used as a mulch but, because of the introduction of weed seed, has proven expensive unless it is very clean or is a year old. Maple leaves have also been troublesome because of the great number of maple seed that usually is mixed in, and which germinates in the beds. Cottonwood leaves have been much more satisfactory. These leaves are used extensively by the Crown-Willamette nursery at Willamette, Oregon, the source of the leaves being an 18-year-old plantation of cottonwood adjoining the nursery.

With the object of determining the efficacy of various types of mulches, the author outlined a series of experiments that were carried out in 1929 by two junior forestry students, Homer Hartman and Chester Bennett, at the Oregon State College. The work was all done on 1-0 Douglas fir transplants at the

Clarke-McNary nursery, seven miles north of Corvallis, Oregon.

In the Oregon State College test two parallel transplant beds of Douglas fir, 4 feet by 175 feet, were used, one of which served as a check bed, the other was divided into 35 plots of ten rows each. Each plot contained 330 trees and measured 4 feet by 5 feet. One of these plots was mulched with Pabco Thermogen mulch paper, one with sawdust, one with maple leaves, one with used straw, and another with one-seventh-inch Douglas fir veneer. These five mulches were then repeated in order, down through the bed, seven times.

These two beds were cared for by nurseryman Vern McDaniel during the summer, and in the fall he reported that, although in the mulched bed very few weeds appeared, they were more expensive to remove, as it was necessary to take them out by hand.

On March 8, 1930, the seedlings of an average row of each plot were carefully lifted. From this row, twenty average seedlings were selected, tied, labeled and dried. Care was exercised to avoid breaking any roots or twigs. The roots of all were carefully washed. Seven sample lots were removed from the check area. In drying, a uniform temperature of 70 degrees F. was used for a period of 90 hours. The lots were weighed to the nearest hundredth of a gram.

The final calculations were based on the dry weight of the seedlings, following H. L. Shirley, who, in the JOURNAL OF FORESTRY of May 1929 says: "The total dry matter produced by a plant seems to be one of the most reliable measures of growth, for height growth may be at the expense of diameter growth and top growth at the expense of root growth."

In computing the average weight five plots were thrown out as being affected by the previous burning of a log pile on a portion of the beds. Those discarded are indicated in Table 1, by figures in italics.

These data indicate that the unmulched bed produced heavier seedlings than any of the mulched plots. The leaf-mulched plot produced the next heaviest, followed by sawdust, then paper, veneer and straw.

CONCLUSIONS

In nursery practice when there is plenty of water available to carry Douglas fir seedlings through the dry summer in good condition, it does not pay to use a mulch. From a weeding

TABLE 1

CORRECTED DRY WEIGHTS IN GRAMS OF THE TWENTY SEEDLINGS TAKEN FROM EACH PLOT

Mulch	Plot number							Total	Average per seedling
	1	2	3	4	5	6	7		
Paper	*91.35*	83.35	*195.20*	96.70	72.15	73.10	93.35	418.65	4.186
Sawdust	106.21	73.35	*125.95*	67.61	83.25	110.40	87.70	528.52	4.404
Leaves	77.85	69.52	*114.80*	79.85	94.10	106.65	112.60	540.57	4.505
Straw	67.35	56.10	63.15	74.48	82.15	83.00	94.48	520.71	3.719
Veneer	86.00	79.00	72.95	88.69	61.10	81.27	89.20	558.21	3.987
Check	89.00	85.75	*121.02*	85.58	77.07	93.20	111.14	541.74	4.514

standpoint, it was of little advantage to mulch and the size of the seedlings was not increased thereby. Light colored mulch material such as straw and veneer were detrimental. The differences between the other plots were insignificant. It is probable, however, that, where water for sprinkling is scarce or lacking, the use of paper mulch would be advantageous.

REVIEWS

Ueber die Oekonomischen Ziele bei der Bewirtschaftung der Waelder. (The Economic Objectives in Forest Management. By E. A. Martin Hagfors. *Acta Forestalia Fennica, 35, Helsinki, 1929, pp. 161, with bibliography.*

This is a detailed and scholarly discussion of the various theories underlying the financial aspects of forest management. The author—evidently well grounded in the "abracadabra" of forest finance — analyzes the various schools of thought in the field of forest valuation (the ascertainment of values) and of forest statics (the comparison of values). He places the work of H. H. Chapman high in this respect, rating it with that of Chr. Wagner, the great German author. Other than German authors receive careful mention: thus, B. P. Kirkland for his "Flexible Rotation," and Biolley for his "Methode du Controle." Citation is made from Recknagel, Bentley and Guise' "Forest Management," 2nd Edit. 1926.

After a comparatively brief introduction to the economic objectives, which, he claims foresters have too generally disregarded, the author takes up in part one (pp. 17-104) the underlying principles of forest finance—largely in the historical manner. Great names of the past parade across his pages—names inseparably linked with the development of "Forstwissenschaft" in the country of its origin: Koenig, Pressler, Judeich, Gustav Heyer, von Guttenberg, Hundeshagen, Borggreve, Endres, and many more. Strangely do their theories of "forest rent" and "soil rent" fall on the modern ear. These men regarded silviculture as the handmaiden of forest management and not as now the mistress of the forest household. In other words, the old school, whether of the "forest renters" or "soil renters" made profitability the primary objective and subordinated all else thereto.

This part includes a masterly analysis of capital and its rôle in forest management. German forest finance of the last century rested on the works of Ricardo ("Principles of Political Economy and Taxation," 1821) which made money the only measuring rod of successful management. He then quotes the modern views as expounded by Seligman ("Principles of Economics," 1923).

"While the differences between land and other things that constitute capital are thus differences in degree rather than in kind, it remains none the less true that land may usefully be put into a separate category. This is due to the fact that an increased supply of other things in general involves a duplication of the thing itself, while the increased supply of land involves a difference in location or fertility. To call this the law of diminishing return is in a sense inexact, since the law of diminishing returns is applicable to everything that

possesses value. The law of diminishing returns, however, has peculiar consequences when applied to land. While land thus is a part of capital from the point of view of the laws which explain the nature of rental value in general, and the relation of rental to capital value, land is usefully contrasted with capital, if we compare changes in land rents and values with changes in the great mass of other things, the increased production and accumulation of which constitute progress. Because of the social significance of such relative changes, it is legitimate to put land into a separate category."

This part concludes with an analysis of "dynamic management," originated by Professor Schmalenbach of the University of Cologne and set forth in his text: "Dynamische Bilanz" of 1926. This school sets not mere money return as the goal but the total returns in whatever form they may occur. Forests, particularly, yield certain intangible values: recreation, watershed protection, and the like, which are dynamic rather than static. Thus also Schmalenbach evaluates future increment not in terms of present discounted money value but as part of a dynamic whole—he objects to the particularization of the forest, as done in the soil-rent theory. (See pp. 86-87 of the text for details). The leading forester to apply this dynamic theory is Ostwald.

In the second part (pp. 104-142), the author examines the economic objectives in detail. First he takes up the various rotations and shows that the theoretical rotations have seldom found application in practice. Even in Saxony, which was officially on the basis of financial rotations (soil rent) the actual rotations were far in excess of the calculated ones.

Of exceptional interest is the material on the "Dauerwald" theory (pp. 117-126). This is Moeller's well known glorification of silviculture, whereby continuous forest production is made the goal of forest management. Working plans are freed from financial calculations. Volume and increment constitute the sole criteria of the allowed annual cut. The economic objective of "Dauerwald" is "the attainment of a growing stock of greatest volume and value". (Moeller: "Der Dauerwaldgedanke", 1922.) This closely approximates Biolley's viewpoint: "A produire le plus possible, le mieux possible, par les moyens le plus possible réduits". In short, no financial difficulties exist for this school, which assumes that mere "Profitability is not the basis of forest production, whether public or private." Eberbach is the great protagonist of this school of "productivity".

The author finds his own objectives best met by the "dynamic theory of sustained yield production". Freed from the swaddling clothes of Forest Rent and of Soil Rent, without falling into the tempting simplicity of "Dauerwald", he develops the essentials of a correct financial appraisal in what he calls "die dynamische wirtschaftstheorie des waldbetriebs" which may be translated as "the dynamic management theory of forest organization."

For example: different interest per cents give different yield values at different ages for the same species and type (he uses floristic types). Thus in the vaccinium type of southern and central Finland, he finds the stand-yield-value of Scotch pine culminates at eighty years with three per cent interest,

at seventy years with four per cent and with five per cent interest. No "terrible formulae" are necessary to make these comparisons: merely good growth and yield tables. These and other essential facts it is the function of the forest experiment station to supply. Practicing foresters will then make the necessary application.

A. B. Recknagel,
Cornell University.

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The Utilization of Marginal Land. By William Allen. *Bulletin 476. Cornell University, Agricultural Experiment Station, Ithaca, N. Y., 1929.*

Abandoned Farm Areas in New York. By Lawrence M. Vaughan. *Bulletin 940. Cornell University, Agricultural Experiment Station, Ithaca, N. Y., 1929.*

Reforestation is the remedy which New York State proposes to apply to its marginal and abandoned lands. The State already has more than two million acres in the Adirondack and Catskill preserves. Now it proposes to purchase and reforest scattered areas of a few thousand acres each wherever widespread abandonment suggests that the land is marginal or sub-marginal for agriculture. It does not require a survey by experts to detect these areas; they are plainly visible. It does require a survey to determine their boundaries, the extent or degree of abandonment, the social consequences, and the most likely road to salvation.

Several of these decadent agricultural areas have been surveyed with considerable thoroughness by students of agricultural economics at Cornell University. The results are contained in two very interesting bulletins of the Cornell University Agricultural Experiment Station—*The Utilization of Marginal Lands* by William Allen and *Abandoned Farm Areas in New York* by Lawrence M. Vaughan. Both bulletins appeared in 1929 but the surveys were begun as early as 1923. The first consists of a description of conditions in Pharsalia Township, Chenango County, and in Ellery Township, Chautauqua County. This is a pamphlet of 109 pages. The second is a publication of 285 pages and includes studies of fifteen decadent farm areas. The two communities studied by Mr. Allen are naturally covered in somewhat greater detail than the larger number by Mr. Vaughan.

It is impossible in a brief review to even list the numerous items covered in the surveys. One can do no more than give a very sketchy digest of one of the descriptions and then present the conclusions of the authors in respect to the general problem.

The first settler came from Connecticut and located in what later became the town of Pharsalia in 1797, and the area attained its maximum population (1,261) in 1860. Since then there has been a steady decline in population. In 1923 the number of inhabitants was 553, which is almost exactly the number reported in 1814, seventeen years after the first settler arrived. Most of the farm operators are past middle life

and there are very few young people in the district.

The topography of Pharsalia is irregular and its inclines are generally very steep. The average elevation is about 1,750 feet. There are no incorporated villages in the township, but there are three small centers, in two of which there are general stores, a blacksmith shop, a cheese factory, a church, and a school. The third hamlet has a church and a school but no stores and its cheese factory is closed.

When the survey was made in 1924 there were 103 inhabited farm dwellings and 74 vacant. Of the latter, 46 were in such a state of ruin as to be uninhabitable. The area surveyed contained 98 operated farms and 66 vacant farms, woodlots, and miscellaneous parcels. The total acreage is 25,445, of which 8,762 acres is crop land. The farms average 181 acres per farm and the principal source of revenue is the sale of live stock and dairy products. On the 98 occupied farms there was at the time of the survey an average of 53 acres in hay, 7 acres in other crops, and 3.2 acres of crop land unused. On the vacant farms 38.4 per cent of the crop land was unused and most of the rest was in hay. An increasing percentage of the area of both the occupied and unoccupied farms was used for pasture. About one-fourth of the area is in woodlots, some of which are in good condition. The returns from the sale of forest products, including maple sugar, constituted over 7 per cent of the aggregate farm income. About half of the woodland area is now pastured, but much of it has very little pasture value.

It is estimated that the 6,364 acres now in woodland have 8,276,000 board feet of standing timber and that the growth is 512,080 feet per year. It is estimated that if this area were put under forest management the annual growth would be 1,171,000 feet, and that if the 19,081 acres now in crop land and pasture in various stages of abandonment were reforested and put under management the growth on the new wooded area would be 13,740,750 feet per year, and thus on the whole area nearly 15,000,000 feet per year.

The survey includes many interesting tables analyzing farm income, farm expenses, taxes, character of buildings, land values, age of owners, number of children, and other pertinent information that cannot be presented in this brief review. It might be stated in passing, however, that the annual tax on these farm lands and woodlots is equal to 3.2 per cent of the owners' valuations of the properties, and 8.6 per cent of the total operating expenses. The average investment per farm in 1924 was $4,598 and the average net income, after taxes, was $588. This is the amount left to pay interest, board of hired labor, unpaid family labor, and labor of operator.

The survey shows that 47 of the poorer farms showed a net income of only $431 per farm, whereas the remaining 51 farms averaged $733 per farm. These poor farms lie in two contiguous tracts, and contain 15,197 acres. It is the conclusion of the surveyor that these areas should be bought by the State and reforested. The steady depopulation of the region indicates that, under modern conditions at least, these poorer farms are marginal lands

for agriculture. In the opinion of Mr. Allen the soil, climate, elevation, rainfall, size of tracts, and price at which the land can be bought justify the conversion of these lands into forests. The areas which are suited for farming should continue to be used as farms.

Mr. Allen's study included a similar survey of 14,803 acres in Ellery Township, Chautauqua County. Similar conditions prevail and the same solution is recommended.

Mr. Vaughan's report describes conditions in fifteen decadent areas studied by him between 1924 and 1928. In the 15 areas there were 685 occupied farms, 764 vacant farms, and 329 other parcels of land. The aggregate area was 195,032 acres. On an average, about one-fourth of the occupied farms were not operated. The owners of these farms used them as homes and worked out by the day. Of the vacant farms, 47 per cent had been vacant for ten years or more. About one-third of the total area was in woods and only 6 per cent was in crops other than hay. Of the cleared land in all areas, 40 per cent was idle. Land was considered in use if nothing more was done than to run a mowing machine over it to cut some weedy hay.

In most of the areas, abandonment has been going on for from fifty to seventy-five years and is yet far from complete. "Abandonment," Mr. Vaughan reminds us, "is an exceedingly slow and painful process."

Summarizing, Mr. Vaughan says: "These regions were abandoned primarily because of the natural poorness of the soil. They are regions which should never have been cleared, as they are better adapted to forestry than to agriculture. The returns from farming this land are not sufficient to give an intelligent farmer a standard of living comparable with that of the people with whom he associates from other sections. He is constantly aware of better opportunities on other farms or in other occupations. Foreigners may stay for a time because conditions are better than in the countries from which they came, but even they soon learn of better opportunities. . . . . These lands are constantly wasting the lives and the money of new buyers, who should be spending their time and money on better land.

"In order that such land shall be kept from agricultural production and still not remain wholly idle and unproductive, forestry has been suggested as the logical remedy. Fortunately, much of the land not adapted to farming is excellently adapted to growing trees. Most of the best white pine land of New York is inferior for farming. Consequently, from the standpoint of soil, a forestry program is thoroughly justified.

"In most of the areas, a few farms are included that might be left as farms, for a time. The area to be planted would probably average less than 60 per cent of the total area, but would be much more or less than this in individual areas. The owner of this land cannot reforest it because with so little property he cannot make long-time investments. The local governments are not in a position to do much reforesting. Apparently the State must do the work if it is to be done.

"The State has three uses for such land: for lumber, for recreation, and

for hunting. The State obtains revenue from hunting licenses and automobile taxes, while the individual receives revenue from lumber only. The State has size and length of life, and is therefore in a better position to do reforesting than is an individual.

"The purchase of this abandoned farm land may be justified wholly independently of the timber and recreational features, as it removes from private ownership land which is wasting the time and effort of many persons. The purchase of this land by a public agency would . . . . put an end to the exploitation of innocent persons which has been going on for the past century. . . . . Most of the resident owners are very desirous of moving. The purchase of their land by the State would make it possible for them to realize this desire, and the cash received would give them a start on some better farm or at some other occupation. A life lease could be given to elderly residents not wishing to move."

Mr. Vaughan recognizes that the purchase of this land by the State might introduce a tax problem, for most of the areas that would be reforested are hill areas interspersed with valley land that is suitable for farming. If the poorest land is freed from taxation and the entire burden is thrown on the agricultural land, it might amount to confiscation of land that is adapted to farming. However, the blocking up of these marginal lands and their removal from cultivation would permit some roads to be closed, some school districts to be abolished, and some townships to be combined. Moreover, it seems to the reviewer (and this is a point not made by Mr. Vaughan) that with the people living more compactly and on better soils, not only would the costs of government be reduced but the income with which to pay taxes would be increased.

If the voters of New York ratify the bond issue permitting the acquisition of such decadent areas for reforestation, the undertaking will be watched with great interest. It will offer grave temptations; there will be unlimited opportunities for patronage. On the other hand, it will permit real demonstrations in rural planning, a hitherto neglected but very essential phase of nation-building.

PAUL W. WAGER,
U. S. Forest Taxation Inquiry,
New Haven, Conn.

Assessment Ratios of Rural Real Estate in Oregon and Washington. By Daniel Pingree and R. C. Hall. *Progress Report No. 6, Forest Taxation Inquiry, U. S. Forest Service, New Haven, Conn., February 15, 1920.*

The primary purpose of this inquiry was to discover whether there exists any serious discrimination in assessment between classes of rural property, and in particular with respect to forest property. On account of the difficulty involved in obtaining the necessary data a limited number of counties only could be studied; in Eastern Oregon,—Baker, Grant, and Klamath; in Western Oregon,—Clatsop, Coos, Lane, and Tillamook; and in Western Washington,—Clallam and Grays Harbor.

The primary sources of information

as to sales data are the county records verified, wherever possible, by questionnaires addressed to both grantor and grantee. Subsequent conclusions are of two classes, those based upon verified and those based upon unverified data. (Due to the close similarity in results, conclusions based upon verified data only are here considered.)

Sales data were classified according to the kinds of properties represented; —farm properties; grazing properties not in farms; cut-over or burned forest properties not in farms; merchantable timber properties; and "all other" properties, the latter including manufacturing, power, and mineral properties. Due to a lack of sharp distinction between grazing and cut-over properties, and to a paucity of data these two classes are combined in the report.

The more significant findings in this inquiry are contained in Table 1.

These data disclose that the farm property class has lower assessment ratios than the merchantable timber class in each of the six counties and lower assessment ratios than the grazing and cut-over property class in five out of the six counties. Merchantable timber has higher assessment ratios than grazing and cut-over properties in three out of the six counties and lower assessment ratios than grazing and cut-over properties in the remaining three counties.

The assessment ratios of properties grouped under "Other classes" are erratic and for the most part relatively low. This condition is ascribed to the assessment practice of assessing improvements, which generally constitute a considerable portion of the total value of these properties, at a ratio considerably below the ratio at which the land is assessed on which these improvements are located.

Some question arises as to the representative character of the properties sold. There appear, however, no strong evidences that the properties under consideration are not representative. The reader is cautioned against the assumption that the over- or under-assessment of one class of property as compared

TABLE 1

ASSESSMENT RATIOS, BY USE CLASSES, 1921-1928

Selected Counties, Oregon and Washington

Per cent

State and county	Class of property				
	Farm	Grazing and cut-over	Merchantable timber	Other classes	All classes
Verified:					
Oregon					
Baker	62	105	68	68	64
Grant	50	94	64	18	63
Klamath	30	43	49	34	40
Lane	33	57	42	28	35
Washington					
Clallam	58	55	80	22	70
Grays Harbor	28	54	72	29	49

with another class indicates absolute burden of taxation. "It is conceivable that all rural real estate in these states may be over-burdened with taxation, even including the most favored class".

The variability of assessment ratios as between the individual properties in the farm, grazing and cut-over, and timber classes was measured by verified sales data in five counties. For lack of adequate data, "Other classes" were omitted in all counties and all data for Clallam County were omitted. "The absolute ranges in assessment ratios . . . . run from the extreme case of grazing and cut-over properties in Grays Harbor County, where the range is from 3 to 4,300 per cent, down to the comparably stable assessment practice in the case of timber properties in Grant County, where the range is from 27 to 150 per cent."

Arranging the sales data for each class of properties in groups according to assessment ratios disclosed the fact that some groups of property were assessed from 5 to 20 times as high as other properties. The greatest relative range in variability in assessments occurs, in every county except Grays Harbor, in the merchantable timber class, and the greatest absolute range occurs in either the merchantable timber or the grazing and cut-over class. This is apparently due to the greater difficulty experienced in assessing these properties. A statistical unit of measurement, the measure of dispersion, registering double the amount of taxes misplaced by inequalities in assessment, was found to be for Baker County 34, for Grant 44, for Klamath 44, and for Lane County 40.

A tendency to assess properties of high value at a relatively lower rate than those of lower value is evident in Oregon and Washington, if the timber class in the western counties is excepted. Grazing and cut-over properties are the more adversely affected by this kind of discrimination.

A full graphical presentation of the data and findings appears in the back part of the Progress Report.

W. H. Dreesen,
School of Commerce,
Oregon State College.

Farm Property Taxation in New York. By Irving J. Call. *Bull. No. 485, Cornell University, Agricultural Experiment Station, June, 1929.*

This bulletin contains many significant facts buried beneath a rather jerky English construction and a bewildering sequence of tables. In spite of these faults of style, however, the bulletin is well worth while as a study of farm income, value, and taxation in certain rural regions of New York.

The title page features an outstanding contribution of the bulletin: That the percentage of net farm and family income taken by general property taxes in the selected regions has shown an increasing tendency since 1910, culminating at 13 per cent in 1923. From 1923 to 1924, the last year given, the percentage dropped to a fraction over 9, probably due to unusually good farm income in 1924. Of course, these percentages would be much higher if they

were based on property income alone rather than on total farm income.

Taxes composed from 0.9 to 3.2 per cent of the operators' valuations on their farms in the different selected regions in 1923 and 1924 (Table 40). It is obvious from this fact that taxes took a large proportion of farm property income at ordinary rates of capitalization. This condition is not confined to New York. In three towns in New Hampshire the 1928 taxes composed from 1.4 to 2.7 per cent of the appraised values of farms. (*See* Forest Taxation Inquiry: *Preliminary Set of Tables Relating to Forest Taxation in New Hampshire*, Tables 34, 37, 40, and 43-45, March, 1930).

Tables 10, 19, 22-26, and 36 show that "large farms" have higher assessment ratios than "small farms" in the selected regions. This is rather surprising, since practically every intensive study of assessment ratios in other states has found the contrary to be the case, or at least the practical equivalent of the contrary—that properties of high value are assessed at lower average ratios to their value than are other properties. It is sufficient to mention only Englund's, Dreesen's, and Daugherty's studies in Kansas, Oregon, and Delaware, respectively.

One reason suggested for the higher assessment ratios of large farms than of small is that the large farms have a lesser percentage of their total value in buildings, and buildings are distinctly under-assessed compared with land (pp. 28-29). The small farms, therefore, obtain a greater relative benefit from the under-assessment of buildings.

On this page 28 just cited occurs one of the textual lapses which unfortunately mar the bulletin. The following two sentences occur at the beginning of a section: "Large farms were worth more per acre than small farms of similar character. In all except one of the five regions reported in Table 39, the small farms were found to be worth more per acre than the large farms." How these two sentences are to be reconciled does not appear in the text.

Some of the suggestions made to improve rural taxation are: Increased income taxes and state aid, decreased property taxes, a county assessor to aid the town assessors, tax collection by the county treasurer, and mailing of tax bills.

D. Pingree,
U. S. Forest Taxation Inquiry,
New Haven, Conn.

Soil Erosion—A Local and National Problem. By C. G. Bates and O. H. Teasman. *Research Bulletin 99. Agriculture Experiment Station, University of Wisconsin, cooperating with the Lake States Forest Experiment Station, pp. 100, Figs. 63, Tables 11. August, 1930.*

Foresters, individually and as a group, are becoming more and more erosion-conscious, as indicated by the recent studies and publications by them on erosion subjects. Since the 1927 Mississippi flood, the erosion problem has been given more attention than at any previous time. Four of the United States forest experiment stations have definite

erosion projects on their programs, and the role of forests in preventing and controlling erosion and run-off is being carefully studied.

Research Bulletin 99 is the direct result of the erosion studies carried on by the senior author from the Lake States Forest Experiment Station, cooperating with the Agricultural Experiment Station of the University of Wisconsin. Rainfall, run-off and erosion records were taken under varying conditions during 1929 and the actual findings are based on the data collected in this period.

The subject matter is divided into seven chapters, with the following headings:

I. The Problem
II. The Region Studied
III. The Causes of Erosion
IV. Extent of Erosion in Wisconsin
V. Relation of Land Management to Erosion
VI. The Control of Erosion
VII. Suggestions for Meeting the Problem

Anyone doubting that Wisconsin is confronted with a serious erosion problem need only refer to the excellent illustrations to be thoroughly convinced that soil erosion is a live issue in at least portions of the state. The area covered by the erosion studies "embraces three counties in the unglaciated section of southwestern Wisconsin, and to a very small extent the Minnesota territory adjacent in the vicinity of Winona". A relief map of Wisconsin shows the ruggedness of the territory in which erosion is most severe. This territory lies in the "unglaciated region" and has two general soil types; the fine sand and sandy loam have been derived from the native sandstones and limestones; and the silt loams of loessial origins. The sandy soils are more porous than those derived from the loess and the loessial soils are therefore more subject to washing. The loess deposits in the deepest places may reach a depth of 20 feet or more, but average about 3 or 4 feet in depth.

The rainfall of the areas studied varies from 30 to 33 inches a year, with the heaviest precipitation during the late spring and summer months. During the winter months, there is a considerable snowfall, with low temperatures, so that the accumulated snows are carried off during the spring thaw. "This possibility of accumulation and heavy run-off over deeply-frozen ground, together with the heaving and loosening action of ground freezing, is a considerable item in creating erosion liability, to which more southerly regions are not subject." The above statement seems to belittle the action of frost and freezing in the so-called southerly areas. Mississippi no doubt comes within that category, and yet the reviewer in his own studies has found frost and freezing to be real factors in erosion in the soils of loessial origin in that state. The fact that in Mississippi, heavy rains usually occur as soon as warmer weather sets in causes the loosening action of frost to be particularly effective in causing huge masses of soil to slough off.

In Chapter III, where the causes of erosion are fully discussed, while no facts have been brought out that have not already been discussed by previous investigators, such as Lowdermilk, Ram-

ser, Bennett, Craven, Middleton and others, they have been very clearly summarized and their application shown to the local conditions. The clear-cut definitions given on page 15 are particularly helpful, and a few are worth repeating here:

"*Run-off* means the movement of water over any ground surface. . . . ."

"*Erosion* means the loosening and removal of soil from its previous resting place by the action of water."

"*Sheet Erosion* is the process going on when a smooth, even surface is washed by rain."

"*Fingering*, often called 'shoe-string gullying', is the process which quickly follows sheet erosion. . . . . The term implies the formation of tiny gullies which converge toward the lowest point of the field. . . . . When this process attains sufficient magnitude so that the channels for the water are not readily changed or obliterated, the process is called *gullying*."

Several of the State agricultural experiment stations in the Southwest, and more recently the U. S. Bureau of Chemistry and Soils, have made very careful studies of the run-off and erosion on varying slopes and under varying conditions of cover. The work of Phillips at the Guthrie, Oklahoma station of the Bureau of Chemistry and Soils had indicated that the run-off from a 0.01-acre scrub-oak plot which had been burned over was 100 times as great as the run-off from a similar plot where no fires had occurred. In all these experiments, particular care was exercised to place a thin strip of metal or lumber around the edges of the plot to completely isolate it. The "erosion traps" used in Wisconsin were not so carefully installed, and the traps themselves were found to be too small to catch all the silt and run-off from a single rain. Thus, the quantitative results may be incomplete and slightly inaccurate, but they nevertheless indicate the close relation between cover, run-off, and soil wash. The charts shown in Figures 30 and 31 are of particular interest in showing the effectiveness of forest cover. Thus, on a short, steep, brush-timbered area, the run-off as measured by the trap was less than 1 per cent during the most violent rain of 1929. For pastures, the run-off was from 14 to 37 per cent, and in a corn field the run-off was as high as 44 per cent. It is to be regretted that no further comparison can be made between plots, due to the fact that the conditions of soil and slope are so variable. The charts, however, tell the tale, and show how cultivation in most cases add to the run-off and erosion. Table X summarizes the run-off rates under different cover conditions as follows:

TABLE X

RUN-OFF RATES UNDER DIFFERENT COVER CONDITIONS

Character of cover or class of land use	Number of examples	Average maximum run-off percentage
Forest	12	2.8
Wild pastures	5	7.2
Cultivated hay	3	17.7
Small grains and fallow	6	25.6
Corn fields	6	25.7
Seeded pastures, mostly blue grass	7	26.7

Here, again, the picture is not entirely a fair one, for the authors state "Seeded pastures, due to close cropping, packing of the soil, and in general to steeper

slopes than prevail in the fields, are probably the largest contributors of run-off water". What would have been their status if they had not been on steeper slopes?

To a forester, the chapter on the control of erosion is a distinct disappointment. The four possible methods of control are listed as follows:

1. "Reducing the run-off by making the soil more absorbent."

2. "Keeping the soil covered. A rank growth of vegetation also slows up the run-off and causes more of it to be absorbed."

3. "Holding and diverting the water along courses having such a small gradient that no damaging erosion occurs. This principle is employed in terracing."

4. "Conveyance of water from higher to lower levels in artificial channels. . . . ."

Methods of stopping and controlling erosion are discussed in considerable detail, but seemingly entirely from the standpoint of the agricultural engineer. No doubt this is due to the fact that the land in southwestern Wisconsin is valuable chiefly for farming purposes, and land values of from $50 to $100 per acre are involved. It has been shown, however, that a forest cover is the most effective of any in preventing run-off and erosion. If such is the case, it should be safe to assume that a forest cover, in some instances at least, might also be used for erosion control work. The effective use of trees to stop and control erosion has been excellently demonstrated by the work carried on by Maddox in western Tennessee. Would not similar measures be applicable in Wisconsin, and in part, at least, take the place of expensive soil-saving dams, rubble dams, rock-lined channels and the like? In a state where dairying is such an important industry, the need of good pasture land is quite evident, but isn't there a point where grazing causes such an erosion problem that the land might better be devoted to the growing of forest crops? The statement is made "This would release the roughest land for timber". But is the growing of timber going to be recommended only on the roughest land? Terraces, of course, are to be highly recommended for agricultural lands, but in the final disposition of the water collected by terraces, a tree-protected ditch or draw is often very desirable.

If some of the large gullies mentioned in the text are controlled, it is doubtful if the land can be used for farming purposes. Trees no doubt can be used to help in the control work and at the same time it may be possible to grow a timber crop.

The relation between erosion and Mississippi River flood control is discussed in the chapter on "Suggestions for Meeting the Problem", and it is here that the role the forests might play is finally brought in. We all concede that the extension of the forests at the important headwaters of the Mississippi River will do much to ameliorate the flood conditions, but some rather intensive and extensive studies need to be carried on before we can talk on a dollars-and-cents basis. The establishment of forests or parks, either by the federal government or by the state, is rcommended for some of the steeper land areas and, for slopes of over 25

per cent gradient, it is recommended that they be kept in timber.

It is hoped that the excellent work begun in Wisconsin will be carried on over a period of years and that the role of forests and reforestation in erosion and flood control will be fully studied.

In reading this bulletin, foresters will have an excellent chance to learn what the agricultural engineers are doing as their contribution to the solution of the erosion problem, and to see how a forester can fit his plans in with those of the agriculturist.

G. H. Lentz,
Southern Forest Experiment Station.

Observations en Matiere Forestiere en 1927. (Observations of forestry factors during 1927.) Anonymous. *Bull. Soc. Cent. Forest. Belgique. Vol. 36, No. 2, pp. 77-84, 1929.*

This is a statement, from the forester's viewpoint, of the outstanding events of 1927 in Climate, Vegetation, Seed Crops, Insects, Fungi, Research, Commerce, Restoration of Devastated Areas, Law, and Miscellaneous.

H. T. Gisborne,
Northern Rocky Mt. Forest Experiment Station.

Conservation of Our Natural Resources. By Loomis Havemeyer, Gar A. Roush, Frederick H. Newell, Henry S. Graves, George S. Wehrwein, Paul G. Redington, and Elmer Higgins. *pp. 551 Macmillan Company, N. Y. 1930; $4.00.*

The cause of conservation is greatly helped by the complete revision of Doctor Charles Van Hise's "Conservation of Natural Resources in the United States." In fact, the new book on "Conservation of our Natural Resources," is more than a revision for it is an up-to-date re-presentation of the whole situation by Doctor Loomis Havemeyer, and by a number of other men who helped formulate the conservation policies about which Van Hise's former book was written. Such men as Frederick H. Newell, Henry S. Graves, and Paul G. Redington learned their conservation at the Pinchot-Roosevelt school, and it is stimulating to know that the soul of the conservation ideal goes marching on with such thoughtful leaders.

The new book presents much more material than the original; in the main presentation it follows the earlier but with this slight difference which may be apparent to a critical reader: Conservation as presented in Van Hise's work was mainly humanitarian; in Havemeyer's approach to the subject it is more largely economic, and perhaps a bit less sentimental. Whether this is an advance or a detriment will depend largely upon the point of view of the reader. Certainly the seven authors of the present book bring a large volume of expert knowledge to the new work. One of the really startling things in this book is that the past two decades have shown so many changed conditions that even so excellent a piece of work as Van Hise's popularization of the re-

port of the National Conservation Commission had to be completely rewritten. Some of the problems of 1910 have been solved or have found their way toward a solution. Other problems, almost altogether new, have arisen; and the new book is the latest word, and the best and most comprehensive, on the present status of conservation in the United States.

BRISTOW ADAMS,
Cornell University.

Klimatet Forr Och Nu. (The Climate Past and Present.) By Axel Wallen. *Svenska Skogsvardsforeningens Tidskrift. Haft II, Vol. 28, pp. 253-270, 11 Illus. 1930.*

That the earth's climate has undergone important changes in ages past is well known from geologic evidence, but what changes have taken place in more recent times and their direction is less evident. Whether we are now in an inter-glacial period, whether we are approaching another warm period such as prevailed before the ice-age, or whether the earth's surface has assumed a relatively constant temperature, are matters of conjecture.

De Geer's investigations of the thickness of annual clay deposits, going back as far as the ice-age, and also records of river stages and tree rings point to changes from year to year, sometimes in more or less definite cycles, but indicate no consistent trend in one direction. Instrumental measurements of temperature in Stockholm extend back 150 years, but reliable precipitation records began only about 70 years ago. Supplementary information on the intensity and duration of low winter temperatures is contributed by records of the dates on which water-ways froze up and were reopened to shipping.

Tree rings are regarded as an indicator of climate, but not always of the same climatic factor. Thus, in northern Sweden the width of rings appears to be a question of temperature, in southeastern Sweden a question of precipitation, whereas in other sections it may be related most nearly in one year to temperature and in the next to precipitation. Similar observations have been made by the reviewer in regard to height growth of western yellow pine at different altitudes in Arizona. The records of the California redwoods are thought by the writer to be an indicator of precipitation, thus agreeing with the conclusions of Douglass.

Glaciers also bear witness of climatic change through their periodic advance and recession. There seems to be general agreement that the Alpine glaciers were less extensive in the Middle Ages than in the 16th century. An instance is related from Hohe Tauern of mines that had been operated for centuries being buried in ice in about the year 1550. The thickness of the ice covering increased to 25 meters in 1570 and to 100 meters in the early seventeen hundreds. In 1880, it had decreased to 40 meters, and now the ruins of the old buildings are visible after being buried 400 years.

A weakness of both the glacier and the tree ring records is that variations may be the result of changes in either temperature or precipitation, or both. As far as indirect records can be applied, however, the indications are that

temperature has been subject to less fluctuation than precipitation.

Indirect sources of information of the character described have been drawn upon by a number of writers in support of the assertion that winters were much more severe between the 13th and 16th centuries than now; other writers using similar sources have arrived at contrary conclusions. Actual temperature records between 1776 and 1925 at seven stations in Europe, however, show that unusually severe winters were more prevalent during the first half than during the last half of the period.

The author has compiled records of mean annual temperature at Stockholm from 1776 to 1925, and has divided them into three periods, 1776-1825, 1826-1875 and 1876-1925. They show that the means for the first and last periods were almost identical but that a depression of 0.3 degrees C. occurred in the second period. Curves of mean annual temperature plotted by years for the entire period indicate a similar trend. Further analysis of these records shows that the first period was characterized by short, cold winters and long, warm summers; the second by continued cold winters and cooler summers; and the third by warmer winters and cooler summers. The author sees in these trends a gradual transition from a continental to a more maritime climate. Whether the climate will continue to change in this direction or whether it will swing back to a period of greater extremes is an important question which remains unanswered.

G. A. Pearson,
Southwestern Forest and Range Experiment Station.

Studie o Vlivu Skupinoveho Hospodarstvi Lesniho. (Study of Influence of Group-selective Cutting upon the Soil.) Mejstrik-Vrbensky and Wilde. *Zemedelsky Archiv., XX, Nr. 5 and 6. Prague, Bohemia. 1929.*

The authors have studied the influence of group selective method of forest cutting upon the features of soil profile. The work was done in the forests about Pilsen, Bohemia, and in the laboratories of Dr. Jos. Sigmond and Dr. J. Stoklasa of Prague, during the years 1926 and 1927.

In matured Scotch pine stands small areas (0.5 to 1.0 acre) were cut over 30 years ago, in accordance with Gayer's method of reproduction. Later on these areas were partially regenerated in a natural way with pine and birch, and partially were underplanted artificially with beech, fir and spruce seedlings.

In old stands, as well as in groups of young reproduction the series of soil profiles, 4 to 5 feet in depth, were dug. The soil was studied microscopically in place; afterwards samples for physical, chemical, and biological analysis were taken from each horizon of the soil profile. The results of laboratory work were checked twice by new field observations and control analysis of new samples.

The general conditions of the working area are as follows:

Climate, topography and geology: The average direct sunlight is nearly 1,650 hours annually; mean temperature of growing season 60 degrees F; mean precipitation of growing season 10 inches ("Fagetum"); rainfall factor (relation between precipitation and temperature

above 32 degrees F, considered in millimeters and degrees of Celzius)—about 60. Slightly undulated plain. Alluvial outwash upon the carbonaceous sandstone. *Vegetation of old stands:* Scotch pine 90-100 years old, 70 per cent of density, III site (Schwappach); no undergrowth or natural reproduction; *Vaccinium myrtillus, Calluna vulgaris,* and *Leucobryum. Vegetation of groups of reproduction:* Beech, birch, pine, fir, and spruce, all about 20 years old in average, full density; in open places abundant growth of *Aira flexuosa,* some *Polytrichum commune* and a little of *Vaccinium myrtillus. The soil from old stands:* The surface is formed by a layer of typical raw-humus, 4-5 inches in thickness (A_0); this is sharply limited by the light grey, strongly podsolized loamy sand (A_2), underlain at a depth of about 15 inches by reddish-brown sandy loam (B) with rusty concretions and even complete stonelike cementation (Ortstein) in places; the parent material (C) starts from the depth 35 to 40 inches and consists of heavy loam with brownish mottling in the lower part of the profile (beginning of Gleihorizon); the geological substratum (standstone) has considerable depth. *The soil from groups of reproduction:* Half-decomposed litter about 1 inch thick, underlain by a half-inorganic, half-organic "infiltrate" layer (A_1) 2 or 3 inches in thickness; the rest of the profile is nearly the same as it is in old stands; the number as well as size of ortstein concretions is, however, considerably smaller; also the cementation is less pronounced and most of the concretions can be easily broken between fingers.

On the basis of data from the laboratory work obtained, the authors came to the conclusion, that the natural and artificial substitution of old Scotch pine stands by mixed hardwood-coniferous vegetation in groups, 25 to 30 years ago, resulted in:

1. Almost complete decomposition of accumulated organic matter, particularly of a thick layer of *Leucobryum.*

2. Substitution of fungi by the flora of bacteria and higher edaphon, even the mole.

3. Larger equilibrium of sesquioxides and colloidal substances in A and B horizons.

4. Considerable oxidation and decomposition of ortstein concretions.

5. Larger amount of available moisture in surface layers due to the better use of condensative water.

6. Smaller water-holding capacity of subsoil due to decomposition of ortstein concretions (Mean absolute water-holding capacity of the B-horizon from groups of reproduction was 31.2 per cent by volume in spite of 37.7 per cent from old stands).

7. Better air drainage (mean absolute air-capacity of A and B horizons from groups of reproduction was 8.1 per cent and 9.5 per cent by volume in spite of 2.2 per cent and 2.1 per cent of A and B horizons from old stands).

8. Considerable decrease in hydrogen-ion concentration, so far as the actual (from 6.11 pH (A_2) to 6.41 pH) and exchangeable (from 4.04 pH (A_2) to 4.40 pH) acidities are concerned.

S. A. Wilde,
Lake States Forest Experiment Station.

The Yield of Douglas fir in the Pacific Northwest. By R. E. McArdle and W. H. Meyer. *U. S. Department of Agriculture Technical Bulletin No. 201, pp. 64, figs. 17, tables 21. 1930.*

Douglas fir is the predominating tree species west of the Cascade Range in Washington and Oregon. The second growth area, with which this bulletin is directly concerned, covers an estimated area of 5,000,000 acres not including the vast area of potential lands, on which Douglas fir reproduction is lacking or is too scant to be an immediate vital factor. This species can be ranked easily among the first half dozen fast growing species of the United States and among the first two producing the largest yields. The variety of conditions under which it grows is well illustrated by the range of site index classes in the tables: namely, from site index 80 to site index 210 (basis, 100 years). Although the ratio in site indices is only 1.3, the ratio in merchantable volume at 100 years is 1:13. On shorter rotations the ratio is still higher in favor of the better sites. In general the tables cover five site quality classes, each subdivided into three site index classes. A variation in age of from 20 to 160 years is included. The upper age limit may seem high but timber of this age still has the second-growth characteristics and is still within the "red fir" definition. Values in the tables cover number of trees, basal area, average diameter, average height, cubic foot volume and increment, board-foot volume and increments in both International and Scribner rules. In addition, distinction is made between the total stand, the portion of the stand above 7 inches in diameter and the portion over 12 inches in diameter. Stand tables are given showing the distribution of the trees into diameter classes, so that the forester may take into account not only the average dimensions but also the complete character of the stand. A single sample of the values which can be drawn from the tables is given in the accompanying Table I of the reviewer, made up for a very good site (Index 200), an average site (Index 140) and a very poor site (Index 80) at 100 years of age.

TABLE I

YIELD OF DOUGLAS FIR

	Site Index		
	200	140	80
Number of trees	75	184	403
Number of trees above 7 inches	75	182	301
Number of trees above 12 inches	75	145	78
Average height	200	140	80
Total basal area	312	283	193
Cubic-foot volume	19,140	13,270	5,350
Bd. ft. Volume Scribner rule	115,100	62,800	9,600
Bd. ft. Volume Inter. Rule	148,900	94,700	28,800
Average diameters	27.6″	1.69″	9.4″
Range of diameters	12-43	8-27	2-15
Current annual increment (Scrib.)	1,030	780	270

The methods employed in assembling the data and constructing the tables are

discussed in detail, but they follow the methods which have been made standard for U. S. Forest Service practice in recent years.

THORNTON T. MUNGER,
North Pacific Forest Experiment Station.

The World's Future Lumberyard. Forests in Latin America Cover an Area Larger than the United States Proper. By William R. Barbour. *The Pan American Magazine, Washington, D. C., Vol. 43, No. 4, pp. 267-274, Oct., 1930; illustrated.*

"Something of the importance of the forested regions of Latin America may be grasped when it is realized that they cover well over three millions of square miles, an area larger than continental United States exclusive of Alaska, and four times as great as the forested portion of the United States. They contain at least six thousand billion board feet of standing timber, more than the total contents of our own forests. The annual rate of growth in the tropics is much higher than in temperate zones. Under proper silvicultural management the forest of Latin America could produce annually some six hundred billion board feet, an amount over twice as great as the present annual cut from American forests.

"Up until the present time, Latin America has done little along the lines of progressive forestry. The state of affairs has been that which prevailed until a few generations ago in the United States; the forests were in the way of the pioneers and were felled indiscriminatly. It is well known that conditions have now changed in our country, and that every effort is being made to conserve what forests remain and to reforest denuded areas, in spite of which a timber famine looms in the imminent future. This condition is being reached in certain portions of many Latin-American countries, where even firewood has become scarce and the bulk of the lumber used is imported from the United States. Inadequate transportation facilities and a scarcity of labor in the woods have made it easier for many coastal regions to import their lumber rather than to draw on their own hinterland.

"Several regions in tropical America, notably Porto Rico, Haiti, and the British colonies Trinidad, British Guiana, and British Honduras, have for a number of years maintained active Departmnts of Forestry, which are conserving existing forests and doing considerable replanting. More recently Brazil has started an ambitious forest program. Certain other countries have made a beginning. The countries of Latin America will in the future have to depend more and more upon their own forests as imported supplies become scarcer and more expensive, and they will find an increasing export demand developing. It behooves them, therefore, to inventory their forests, to promulgate and follow out conscientiously sound forest policies, and so to derive the greatest possible benefit from the natural resources with which they have been so bountifully blessed."

From *Tropical Woods* Dec. 1930.

BRIEFER ARTICLES AND NOTES

Alfred Knight Chittenden
1879-1930

The news that Alfred K. Chittenden had passed away on November 1, 1930, after a severe illness that had involved two operations, came as a sad shock to his many friends, both within and without the profession of forestry. Particularly is this true of his former associates in the U. S. Forest Service and of the two hundred and ninety odd men who have received their training in forestry under his leadership at Michigan State College. For nearly thirty years Chittenden had been making solid and worth while contributions to various phases of forestry. Cut off in the prime of life he leaves behind him an enviable record of meritorious accomplishment. His body was sent to New Haven for burial.

Alfred Knight Chittenden was born in New Haven, Conn., Oct. 28, 1879, the son of Dr. Russell Henry Chittenden, long Director of the Sheffield Scientific School of Yale University, and Gertrude Louise (Baldwin) Chittenden. He was reared in New Haven, preparing for college at the Hopkins grammar school. He entered Yale in the civil engineering course in the Sheffield Scientific School, and was graduated in 1900 with the degree Ph.B., and with general scholastic honors. He was a member of Sigma Xi, and later of the honorary forestry society Xi Sigma Pi. In the autumn of 1900 he matriculated as one of the original seven members of the first class of the Yale Forest School, receiving from Yale the degree Master of Forestry in 1902.

While in the Forest School Chittenden evoked the friendly envy of his classmates because of his ability to think fast and searchingly and to turn in, in a seemingly casual way, work of consistently high grade and merit. Throughout his life his writings were accurate, concise and dependable and imbued with common sense and the high standards of professional integrity. On the personal side Chittenden as a student was modest, somewhat reserved, laconic in speech, and a bit conservative. But he had a quite humor, that, combined with his never-failing willingness to be of help to others, made him popular with his fellows. Later in life these same traits endeared him to all with whom he was brought into intimate contact, and particularly to his own students. From those trained by him at Michigan State College come tributes that attest to his interest in the personal problems of the student body, to his willingness to be of service to all who sought his counsel, and to his unselfish desire to see others have the credit even when no mean share of the merit of the accomplished task could rightly have been claimed by him.

After graduation from the Yale Forest School, Chittenden spent seven months in Europe, visiting the forests of a number of countries. He then entered the U. S. Forest Service as Forest Assistant. Soon promoted to be chief of the Section of Coöperation, he later held the rank of Assistant District Forester and Forest Inspector. In 1907 he and Allen B. Patterson, Yale Forest School, '04, set up in Baltimore a consulting forestry business, which they followed for a year. The following two years he was again in the Forest Service, assigned to District 2, in charge of silviculture. In September 1911, Chittenden joined the U. S. Indian Service, where he served as forester for two years.

During his work for the federal government his work took him into almost all the states of the union. While with the Forest Service he wrote two bulletins, both published in 1905, Nos. 55 and 58 in the "old series", "*Forest Conditions of Northern New Hampshire*" and "*The Red Gum,*" (with W. Kendrick Hatt.)

During the year 1913-1914, Chittenden was Director of the Engineering Experiment Station and lecturer at the College of Engineering of the University of Illinois. All of this was excellent experience and served him well as a background when in 1914 he was called to the position of Professor of Forestry and Head of the Department of Forestry of the Michigan State Agricultural College, now Michigan State College. Here he served until his untimely death.

On February 11, 1908 Chittenden married Miss Lulu W. Brower of Washington, D. C., who survives him, as does his father. They had no children.

As the result of his faithful and unremitting labor the forest school at Michigan State College grew in size and standing and took its place among the recognized forest schools of the United States. In his teaching Chittenden handled the subjects of mensuration, forest management, forest valuation, and forest policy, as well as a course for the students of agricultural on farm forestry. In American Men of Science (1927) he listed his major interests as silviculture and rate of growth of timber.

On the executive side Chittenden developed the college nursery from small beginnings to a yearly capacity of over two million trees, supervised the preparation of forest management plans for all the college properties, including the Dunbar Forest Experiment Station, at Sault Ste. Marie, and put these plans into operation.

Of Chittenden's writings special mention may be made of three Michigan State College bulletins of which he was author: "*Forest Planting in Michigan*", 1921, revised edition 1927, No. 163, "*Improvement of the Farm Woodlot*", No. 122, 1923 and "*Christmas Tree Plantations*", No. 145, 1925; and of two more of which he was co-author, "*Oak Forests of Northern Michigan*" (with Joseph Kittredge) No. 190, 1929 and "*The Farm Woodlot in Michigan*" (with P. W. Robbins) No. 196, 1930. He was also a frequent contributor to the quarterly bulletin of the Michigan Agricultural Experiment Station and of occasional articles to the forestry magazines.

Chittenden's interests were, however, not confined to his college work. In 1903 he was elected a senior member

of the Society of American Foresters and as a member of committees and otherwise took an active part in its work. He was at one time Chairman of the Ohio Valley Section. Among other offices held by him were the presidency of the Michigan State Forestry Association, 1924, a post he held several times; member of the Advisory Committee of the Lake States Forest Experiment Station; and member of the Station Council of the Michigan Agricultural Experiment Station. In many other less conspicuous ways he worked to advance forestry in his adopted state. Finally, he belonged to that group of men, who from their previous connection with federal forestry work, like to speak of themselves as "Forest Service alumni", a name, as all the older foresters in the United States know, that connotes lasting loyalty and willingness to aid in the maintaining of high standards and ideals.

Alfred K. Chittenden belongs in the company of men who, following the pioneers in American Forestry, had the difficult task of helping to get the new machine to run smoothly in the years after 1905 that immediately followed the administrative organization of the National Forests. Those were strenuous days in the Forest Service. Many had a hand in that work. The duties of the staff were greatly diversified. It is often hard today to allot to any one individual the share of praise that is justly his for what was accomplished. Chittenden was ever modest and self-effacing, but that he bore his full part is not to be questioned.

As a teacher Chittenden won and held both the respect and the affection of his students. Through his writings he made substantial contributions to the literature of American forestry, particularly on topics pertaining to the forests of Michigan. Indefatigable as a worker —the only real vacation he ever took was when he and Mrs. Chittenden went to Europe in 1929—he was always ready to listen patiently and to advise understandingly and wisely those who came to him with their problems. Actuated himself by noble ideals, he helped to establish high standards in the days when forestry in America was in the formative stage.

Quiet and unobstrusive, Chittenden was one of those none-too-common persons on whom one knows he can absolutely depend; one who when called upon for service of whatever nature answers the call and brings to the task knowledge, understanding, common sense and the ability, as well as the will to be of help to his fellows. Because Alfred Knight Chittenden possessed these traits and let them be his guides through life, he will be long and gratefully remembered.

RALPH S. HOSMER,
Cornell University.

TIMBER CONSERVATION BOARD APPOINTED

The membership of the new Timber Conservation Board, appointment of which was requested of President Hoover by the lumber industry and others, has been announced. Secretary of Commerce Robert P. Lamont is to be its head and the other members are:

Arthur M. Hyde, Secretary of Agriculture.

Ray L. Wilbur, Secretary of the Interior.

John W. Blodgett, chairman of the board of the Blodgett Co. (Ltd.), Grand Rapids, Mich.

D. C. Everest, president of the Marathon Paper Mills Co., Rothschild, Wis.

Carl R. Gray, president of the Union Pacific Railroad, Omaha, Neb.

Charles Lathrop Pack, president of the American Tree Association, New York and Washington, D. C.

John H. Kirby, president of the Kirby Lumber Co., Houston, Tex.

John C. Merriam, president of Carnegie Institution, Washington, D. C.

George D. Pratt, of Charles Pratt & Co., owners of the Chelsea Fiber Mills, New York.

Paul G. Redington, president, Society of American Foresters, Washington, D. C.

W. M. Ritter, chairman of the board of the W. M. Ritter Lumber Co., Columbus, Ohio, and Washington, D. C.

L. J. Taber, master of the National Grange, Columbus, Ohio.

The need for such a board, as described to President Hoover by the spokesmen of the lumber industry, and its objects, as well as an editorial upon the subject appeared in the October, 1930 number of the JOURNAL OF FORESTRY.

CENTRAL STATES FORESTRY CONGRESS HOLDS THREE-DAY MEETING

The first annual meeting of the Central States Forestry Congress was held in Indianapolis on December 3, 4, and 5, 1930 to discuss a number of matters pertaining to the improvement of forestry conditions in the Central States—Illinois, Indiana, Iowa, Kentucky, Missouri, Ohio, and Tennessee. About 125 persons attended. The objectives of the Congress are given as:

1. To establish in the existing organizations and the public mind the mutual forestry problems of the region such as the marketing and utilization of materials; the protection of existing forests from grazing and fire; the reforestation of abandoned and sub-marginal agricultural lands; the importance of forests in the prevention of soil erosion, the silting of stream channels and the control of floods; the development of outdoor recreation, game and wild life; the advancement of forestry research.
2. To exchange helpful ideas, experiences and methods between individuals and agencies.
3. To formulate progressive and consistent policies of forest reconstruction.
4. To stimulate public interest and concern in the development and wise use of the forest resources of the region.

Interests represented in the Congress include several federal bureaus and offices, several national trade and civic associations, public and private lumbering and forestry organizations of the states mentioned, and a number of private companies—railroad, lumber, pulp and the like.

The formal sessions lasted two days. The third day of the meeting was spent on a field trip to Indiana's 3000 acre state forest, 35 miles from Indianapolis, to inspect its fire protection facilities and to observe the serious erosion taking place on abondoned hill lands and methods for its control, as well as to see the problems of reconstruction faced by the State to bring the land back to profitable production.

Among the papers read were the following:

Public Responsibility in Forest Land

Ownership, Edmund Secrest, State Forester, Ohio; Developing Incomes from Publicly Owned Forests, Ralph F. Wilcox, State Forester, Indiana; Forests For Commercial Game Production, W. B. Grange, U. S. Biological Survey; Forest Fire Organization Work in Kentucky, Wm. E. Jackson, Jr., State Forester, Kentucky; Fire Control Through Fire Wardens, James O. Hazard, State Forester, Tennessee; The Effect of Forests on Erosivity of Soils in Southeastern Iowa, W. E. Tharp, U. S. Bureau Chemistry and Soils; Some Limiting Factors in the Use of Land for Crops and Pasture, G. E. Young, Purdue University; Taxation of Forest Properties and Farm Woodlots, R. C. Hall, Forest Taxation Inquiry, U. S. Forest Service; Which Species Shall We Plant? Edmund Secrest, State Forester of Ohio, and L. F. Kellogg, Central States Forest Experiment Station; Importance of the Farm Woods in the Central States Region, T. E. Shaw, Extension Forester of Indiana; The Farmer Looks at Forestry, R. W. Brown, President, Missouri Farm Bureau, Jefferson City, Missouri; Molding the Forests to Meet the Needs of Established Industries, John F. Preston, Hammermill Paper Co., Erie, Pennsylvania; Development of Hardwood Markets, John I. Shafer, President, National Hardwood Lumbermen's Association, South Bend, Indiana; Prospective Markets for Hardwoods Through Refabrication by Chemical and Mechanical Processes, R. D. Garver, Forest Products Laboratory, Madison, Wisconsin; Local Timber Production and the Railroads, R. J. Plaster, Agricultural Agent, New York Central Lines; The Forests of the Region, Condition and Research Problems Arising from Treatment, E. F. McCarthy, Director, Central States Forest Experiment Station, Columbus, Ohio; and Training County Agents to Direct Forest Improvement and Sales of Farm Woodland Products, G. H. Collingwood, Forester, American Forestry Association, Washington.

The Central States region, once heavily forested with valuable hardwoods, most of which were cleared off for agricultural purposes, contains many areas that have proved to be too poor for profitable agriculture. The region contains also many woodlots amounting in the aggregate, along with tracts of larger than woodlot character, about 50,000,000 acres. These woodlots and forest tracts are important sources of valuable oak, walnut, poplar, hickory and other woods, but are in large part in sub-normal thrift due to grazing and fire. The idle land acreage totals probably 10,000,000 acres.

The success of the congress will give the region a strong agency to promote coöperative work in forest land management.

The Congress adopted resolutions:

1. Urging the Agricultural Colleges to accept their responsibility for a policy of complete land use in their respective states and include in the required curricula of all regular agricultural courses adequate training in the management of the farm woodland.

2. Calling to the attention of Congress and heads of federal departments the need for erosion control research.

3. Urging each state in the central group to establish forest nurseries.

4. Urging that the Governors of these

six states, the members of the several state legislatures and the members of Congress speedily provide necessary legislation and financial support adequate for the protection of all forest land within these states in need of organized protection from fire.

5. Recommending to the President and Congress that additional funds be made available for accelerating the work of the National Forest Census.

6. Recommending to the Governor and legislatures of the various Central states that suitable state appropriations be made to provide for an early beginning by their respective forestry agencies, in the collection of the forest and waste or idle land data in order that these agencies shall be better prepared to coöperate with the Federal agency in event that National funds become available for such coöperative use.

7. Urging that increased funds be speedily provided to permit a more rapid expansion of the National Forest purchase program.

Conservation Conference Held in New York

On November 18, 1930, at Utica, N. Y., the Committee on Conservation of the New York State Economic Council called its second round table conference of a forest policy for New York State.

At the first conference called by this organization at the Lake Placid Club in the Adirondacks last July, Edwin R. A. Seligman, Professor of Political Economy at Columbia University, and Vice-President of the Association for the Protection of the Adirondacks said, in behalf of that Association: "We are ready to relax our watchdog policy provided you (timberland owners and operators) are willing to accept this newer theory . . . . subjection of the individual to the larger, more comprehensive, social consideration that go to make up general prosperity. . . . . In other words, when the private individual shows that he is willing to have social control for the benefit of all concerned, himself included, then we shall be willing to relax our rigid program and to modify our present position."

The Association for the Protection of the Adirondacks, at a meeting on October 31, repudiated this stand. The discussion of the Utica meeting, therefore, revolved around the question of the Hewitt reforestation amendment involving the expenditure of $20,000,000 for planting 1,000,000 acres of idle land in the region outside the park or "blue" lines of the Adirondack and Catskill preserves.

It should be explained that the "inviolability clause" (Article 7, Section 7 of the State Constitution) applies to all the state land now owned or hereafter acquired in the twelve Adirondack and four Catskill counties. This is the so-called Forest Preserve. Within each region, "blue" lines delimit the Adirondack and Catskill Parks, to which as now constituted or hereafter extended, the Hewitt Amendment does *not* apply. Neither does it apply to *existing* state land *outside* the "blue" lines, but within the Forest Preserve counties.

It was apparent that there was not

unanimity of opinion in favor of the Hewitt Amendment as was generally hoped. However, it was felt that the objection to the passage of this amendment, which comes before the electorate in the fall of 1931, is not very serious.

L. F. Kneipp of the U. S. Forest Service made a very significant statement to the effect that the recreational and utilitarian objectives can both be met as exemplified by the policy of the U. S. Forest Service in handling the national forests. He pointed out the number of people who use the national forests for recreation each year and how the so-called wilderness areas have been preservd for the future.

A. B. Recknagel in his capacity as forester and secretary of the Empire State Forest Products Association, explained what the timberland owners have done and are doing in forestry in the Adirondacks. P. A. Herbert, of the Forest Taxation Inquiry, led discussion of forest taxation. W. G. Howard, Superintendent of State Forests at Albany, pointed out that 38,000 acres had been acquired under the Hewitt laws to date. Hugh P. Baker, Dean of the State College of Forestry, emphasized the need of stressing the underlying principles which should be followed in working out a forest policy for the Adirondacks.

Interesting contributions were made by Charles W. Boyce of the American Pulp & Paper Association, George N. Ostrander of Finch, Pruyn & Co., Inc., George W. Sisson, Jr. of the Racquette River Paper Co., and Richard E. Sykes, President of St. Lawrence University at Canton, N. Y.

There appeared to be unanimity of opinion that the areas within the so-called park lines, or as they may be extended by the legislature, should be preserved as parks whereas the areas outside of these lines should be opened for planting and forest management both on the areas now owned by the state and on those to be acquired in the future for reforestation purposes. While there are some serious objectors to the Hewitt reforestation amendment to the state constitution, the fact that the Association for the Protection of the Adirondacks has gone on record as favoring it, together with most of the other organizations interested in a future forest policy for the state, indicates a favorable trend of sentiment.

N. C. Brown,
New York State College of Forestry.

Washington State Forestry Conference Meets

The ninth annual meeting of the Washington State Forestry Conference was held at Seattle, December 4, 1930. The discussions centered around the problems of forest taxation, led by C. S. Chapman and L. F. Cronemiller; the federal forest survey, led by T. T. Munger and H. L. Andrews; extension of state forests, by G. C. Joy; and research, by C. S. Cowan. A new situation had developed in the field of taxation on account of approval at the last election of a constitutional amendment permitting classification of property for taxation purposes. It is now believed that the legislature has power to pass a constitutional yield tax law.

Mr. Cronemiller gave an encouraging report on the application of the Oregon tax law. Usefulness of the federal forest survey in local aspects of furnishing basic information to communities was brought out by Mr. Munger and by discussion.

The Conference, through its committee work and other means, has developed much of the basis of progressive forest legislation in Washington during the past decade. The adoption of adequate forest tax legislation and provision for research in the field of forestry will round out its program in very large measure.

BURT P. KIRKLAND,
University of Washington.

PACIFIC COAST FORESTRY CONFERENCE TO MEET IN SPOKANE IN MARCH

The annual meeting and Pacific Coast Forest Conference of the Western Forestry and Conservation Association will be held in Spokane, March 19-20-21, with headquarters at the Davenport Hotel. The last meeting in Spokane was in 1920.

As usual, the first day will be devoted to affairs of the protection and educational committees. So much interest is being taken in protection equipment that it may be decided to hold a complete equipment show as an adjunct of the conference. The two general-session days will cover important phases of forest growing and protection, probably with special emphasis on economic problems bearing upon forest land ownership and coöperation in protective organization. The program will be influenced both by Inland Empire conditions and by the approaching investigation by President Hoover's recently appointed Timber Conservation Board, which is presumably to consider the economic situation of forest industry.

COMMERCIAL FORESTRY COMPANY FORMED

The consulting forestry firm of Banzhaf & Watson, Inc., of Milwaukee, Wis., sent out a prospectus describing a new venture, Forest Properties, Inc. The new company is authorized "to buy, operate and hold forest properties and to market and trade in forest products;" it "is a Delaware corporation with an authorized capitalization of 30,000 non-assessable shares of no par value common stock . . . . ." Sixty per cent of all funds secured from the sale of stock is to be used for the actual purchase of forest areas. Banzhaf & Watson, Inc., will serve as operating manager. The firm has several second-growth properties under option and is soliciting the participation of foresters who are desirous of investing in a forestry venture.

In writing of his new company, Mr. Banzhaf states:

"This company has not been organized for sentimental reasons. It is not a conservation gesture. We propose to practice forestry for the purpose of making money and we are confident that this end can be accomplished. We recognize that the investment that we

are proposing has an appeal aside from its financial possibilities, but we are anxious that investors regard it primarily as a commercial project, for its ability to produce income is its only economic justification."

State Forester of California Has Large Force

The field force of the State Forester of California during the season of 1930 numbered 178 men, and the money available from State, county and federal sources totaled $612,715. This is in strong contrast to a department of four men and a sum of $77,250 of about a decade ago. The total area protected by the state forestry organization is estimated at 30,000,000 acres of which 18,000,000 acres is classified as timber and watershed area. State expenditures for forestry purposes for the present year are estimated to be as follows:

1. State appropriation for fire prevention and state nursery, $205,000.

2. State allotment for fire suppression, $120,000.

3. Clarke-McNary, federal government allotment, $147,715.

4. County coöperative funds under direct supervision of State, $140,000.

Maughan Second to Join Duke Staff

That Duke University intends to go forward with its plan to develop its forest property as a laboratory before it announces formal courses of instruction is evidenced by its appointment, effective January 1, 1931, of William Maughan as Assistant Director of Duke Forest and Assistant Professor of Forestry.

Following graduation from the Division of Forestry, University of Minnesota in 1925 with the B. S. degree, Maughan served three years as Instructor in Forest Engineering, New York State College of Forestry at Syracuse University. In the spring of 1929 Maughan served as assistant to Professors Chapman and Bryant for 3 months at the southern camp of the Yale School of Forestry, Urania, La., and Crossett, Ark., and in June received the degree of Master of Forestry from Yale. He then joined the staff of the Yale Forest School as Instructor in Applied Forestry under the Charles Lathrop Pack Foundation for the advancement of applied forestry at Yale, which position he resigned to go to Duke.

In Maughan, Duke Forest obtains a man already well trained to assist in the development and management of a demonstration forest area. Under Professor R. C. Hawley of the Yale Forest School, whom he assisted in reorganizing the Eli Whitney Forest as a demonstration area, he learned the problems of applied forestry from an able and experienced teacher.

Mr. Maughan's first work at Duke University will be to organize the Duke Forest as an operating demonstration, research and school forest in coöperation with Dr. C. F. Korstian, Director of the Forest and Professor of Silvicul-

ture. Plans are being formulated to develop a program of research which will be followed eventually by the organization of forestry educational work. This will probably be graduate work, largely of a research nature, leading to the higher degrees in forestry.

Demonstration forests are sadly needed in every forest region of this country. It is not enough to know the basic sciences controlling tree growth and the silvicultural systems developed in Europe; the American forester needs more urgently, actual experience in applying his class-room knowledge.

When Duke University is ready to receive students it will be in a far better position to train forestry practitioners because of its own forest laboratory and activities than if it had to resort to lectures and books alone. Furthermore, remembering that "forest extension" is sorely needed and that it is a type of education, directed to adult timberland owners, the availability of a demonstration forest makes it possible for the extension specialist to remove forestry from the realm of conjecture and imagination and to translate it into actual woods practice which the woodsman can understand.

American forestry schools, with several notable exceptions, are deplorably weak in forest laboratories. While some have acquired forests after their organization, others still evade the burden of an expensive demonstration area. Duke is unique in starting with a forest before it develops classrooms.

E. F.

Ringland to Foreign Service

Arthur C. Ringland, formerly District Forester of the Southwestern District of the Forest Service, and later engaged in special studies and assignments has been appointed to the foreign service of the U. S. Department of Agriculture and will travel extensively in Europe. Mr. Ringland's duty will be to keep the United States informed on the progress and development of forestry thought and practice in Europe. He will pay particular attention to land uses in their relation to forestry.

The agricultural foreign service is being established under a recent act of Congress and the administrative direction is being centered in the Bureau of Agricultural Economics, to which Mr. Ringland will be attached. Technical direction of his work will be handled by the Forest Service.

Mexico Conducts Forest Census

In a speech made recently by Agricultural Engineer Ramon Fernandez before the Society of Mexican Foresters, he outlined the survey of Mexico's forest resources to be made as a part of the agricultural census conducted by the Department of National Statistics.

Senor Fernandez stressed the necessity for obtaining as accurate and complete data as can be procured and stated that it will serve foresters in a threefold manner. First, it will give an index of the exploitability of the forest; second, the progress and danger of de-

vastation will be ascertained; and third, the amount of imports and exports will be determined. This data he said is needed for guiding the making of a forest policy for the nation.

Extracted from *Mexico Forestal*, by
A. N. Weber,
U. S. Forest Service.

Rapid Growth of Yellow Poplar

The Ohio Valley Section of the Society of American Foresters during its October meeting paid a visit to an unusual stand of second-growth tulip poplar near Richmondale in Ross County, Ohio. This was found to be a native stand of tulip, or yellow, poplar and growth data collected by the Central States Forest Experiment Station showed that in 38 years this stand had produced nearly 50 cords to the acre or an average of approximately a cord and one-half per acre per year. Based on present prices paid for pulpwood the gross value of this particular area would exceed $500.00 per acre at the pulp mill located at Chillicothe in 38 years or would produce net stumpage on a cordwood basis after deducting operating costs for cutting, skidding, hauling, etc., of $150.00 per acre or a net return of $4.50 per acre per year on land that is unsuited for agriculture, but having nearby markets or outlets for pulpwood.

Civil Service Examinations

Announcement is made by the U. S. Civil Service Commission that applications for examinations for the grades of Junior Forester and Junior Range Examiner must be on file at Washington, D. C., not later than February 24 and March 10, respectively. The dates for the examinations are to be announced later.

Applications must be made on form 2600 which may be secured from the Commission at Washington, D. C., or from the secretary of the local U. S. Civil Service Board in a large number of cities. Details concerning salary range, qualifications and the like may be obtained from the same agencies.

Logging Bulletin Available

One of the most interesting pieces of trade literature produced in recent years for the logger is a bulletin on the use of caterpillar tractors in the woods published by the Caterpillar Tractor Company, Peoria, Illinois. The booklet is richly illustrated and contains much information on tractor logging. It is of special interest to the forester because of the mitigation of destruction of young growth where tractors are used.

CORRESPONDENCE

Forestry Practice or Theory

Editor, Journal of Forestry,

Dear Sir:

The opportunity to contribute letters of current comment to a new department of the Journal is much appreciated, and it is to be hoped the response will fully represent the views of the profession.

It is true that a number of men are becoming more articulate regarding dormant convictions. Whether they will risk a frank expression of their views in print is something else. One of the best forums of free expression is the close embrace of a Henry Ford for about four hours on a monotonous ride. Load in a professor of forestry, a private forester and a state or forest service man, with an editor disguised as the driver, and you will have copy to fill several issues of the Journal.

The present trend of thought seems to be in the direction of stock taking. It may even go so far as resentment at assumed authority to speak for the entire profession or to predicate remedies on radical or academic statements of the situation. There is the feeling that facts are ignored in favor of theories; that straw bogeys are set up; that there is too much fiddling around on the edge of things. Deep down, it is perhaps the age-old conflict between those who want to save everybody else and those who want to save themselves.

The line of division lies rather sharply between the men who are trying to make the forests provide a living and those who will eat anyway. Any of them is competent to practice forestry if he has a chance. One group wants to be sure the timber grown will be worth cost of production; the other sees dire results if it is not grown regardless of cost. All must agree that someone must pay—and even public money is not free.

On one side is the popular idea, excellent in itself, that more trees should be planted and waste areas reclaimed; on the other side are millions of acres of second growth and low grade timber without market value and eating its head off in taxes and interest. Try even to sell high grade timber or convert it at a profit. Then figure on what constitutes real values or represents waste in timber or money. Some of us think these are live problems for the foresters.

Better markets for forest products at values reasonably above cost of production are as much the salvation of the foresters as of the lumbermen. The alternative is to turn the whole job over to the government and there are many objections to that.

Yours very truly,

E. A. Sterling,

James D. Lacey & Co.,

New York.

SOCIETY AFFAIRS

Annual Meeting a Great Success

The thirtieth annual meeting of the Society of American Foresters was held in Washington, D. C., from December 29 to December 31. The program was probably more extensive and the meetings were attended by a larger number of technical foresters than any annual meeting yet held. Foresters from all parts of the United States, and from Canada, Mexico, France, Switzerland, England, and Australia participated. There was an actual registration of 325.

Among the Society members attending were three of the original charter members—Henry S. Graves, William L. Hall, and Ralph S. Hosmer. Ten state foresters, forty deans of forest schools and professors of forestry, forest economists, wood technologists, timber cruisers, state district foresters and rangers, the chief forester of the United States, a former Chief Forester, three federal Regional Foresters and seven former Regional Foresters, seven Directors of U. S. Forest Experiment Stations, the editor of the Journal of Forestry, all but three of the eleven officers and members of the Council of the Society, many private, consulting and association foresters, a few forestry school students, and large numbers of just plain foresters were in attendance. Every National Forest Region was represented except the Rocky Mountain and Alaska, and the faculty of every forest school in the United States except Oregon State College and the University of Montana.

The program while long, had a great wealth and variety of papers covering a wide range of forestry subjects and were of unusual interest. The "Economics of Forestry" was perhaps the keynote of the entire meeting. There was a birthday banquet (attended by 321), an illustrated lecture evening session, field trips and demonstrations, and several forestry exhibits on display. In addition, excursions and special entertainment features were provided for the ladies. A large number of ladies graced the banquet by their presence.

The program, spread over three days and two evenings, was divided into eight parts. The general topics and the order in which they were carried out were as follows:

1. "Private Forestry Enterprises—Their Progress and Accomplishments," with papers by I. F. Eldredge, Julian E. Rothery, Russell Watson, and Ernest F. Jones,—William L. Hall presiding.

2. "Public Land Policy of the United States," papers by R. Y. Stuart, W. J. Morrill, Walter Mulford, and Dr. John C. Merriam,—H. H. Chapman presiding.

3. Birthday Banquet, Colonel Henry S. Graves acting as Toastmaster. Happy greetings and best wishes from the for-

esters of Canada by Elwood Wilson, from England by W. E. Hiley, from France by Louis Duplaquet, and from Switzerland by J. W. Zehnder; a scholarly address by Raphael Zon, and entertainment features by "the Eddie Cantor of the Forest Service," E. I. Kotok of California.

4. "The Field of the Profession of Forestry," papers by C. P. Wilber, R. E. Marsh, Henry R. Francis, David G. White, Aldo Leopold, and Col. Henry S. Graves,—S. T. Dana presiding.

5. Society Affairs—Reports of Standing Committees and officers of the Society, President Redington presiding. The three outstanding reports here were on "Forest Education" by C. H. Guise, "Forest Policy" by Barrington Moore, and "Industrial Forestry" by Shirley W. Allen.

6. Evening Session—"Pictorial Presentation of Recent Developments in Forestry," illustrated talks, J.A. Cope presiding. The subjects were: "Some Phases of French Forestry Work," by Louis Duplaquet, Inspecteur-Adjoint des Eaux et Forets, Nancy, France; "The Champion Reforestation Machine in Action," by Porter K. Bennett; "Tractor Logging from Woods to Mill," by John Dort.

7. Technical Papers, five papers, by A. E. Wackerman, Dr. L. F. Hawley, S. B. Show, S. B. Detwiler, and S. A. Graham,—Henry Schmitz presiding.

8. Technical Papers—by E. I. Kotok and Duncan G. Rankin—Ralph S. Hosmer presiding. Demonstrations and field trips covering the "Rototiller," tree-planting machine, etc.

This thirtieth anual meeting represented the largest in point of attendance by members in the history of the Society. The papers were of a high order of excellence, and there was at times lively discussion, the one fault being that due to the large number of papers, there was insufficient time for a full discussion in some cases. One of the high lights of the entire meeting was the reading by President Redington of a splendid letter of greeting, counsel and good wishes from Governor Gifford Pinchot, one of the founders and the first president of the Society of American Foresters.

Outside of the many interesting and worthwhile papers delivered during the formal sessions, probably the real pleasure and profit derived by the members from meeting new foresters and renewing old forester friendships was equally enjoyed.

JOHN D. GUTHRIE,
U. S. Forest Service,
Portland, Oregon.

PRESIDENT HOOVER SENDS GREETINGS

December 26, 1930

MR. PAUL G. REDINGTON,
President, The Society of American Foresters,
Washington, D. C.

MY DEAR MR. REDINGTON:

I will be obliged if you will express my cordial greetings to the Society of American Foresters at their annual meeting in Washington on December 29th and the assurance of my deep and continued interest in the conservation

of our forests, which should ever be a perennial source of National wealth and a perennial source of spiritual refreshment for those millions of our people who find pleasure in the outdoor life.

Yours faithfully,
(Signed) HERBERT HOOVER.

REPORT OF THE EXECUTIVE SECRETARY

The Executive Secretary attempts a report of his activities with some apprehension. The results obtained thus far do not indicate any considerable progress. That this was generally expected at the inception of the work does not greatly alter the situation. The several more important activities which are listed below are suggestive of the work to be done rather than a record of three-fourths of a year of effort. Acknowledgement must be made, moreover, of the credit due the many persons, members of the Society and employees in the office who have aided in the work thus far accomplished.

RECORD OF MEMBERS

One of the first tasks assigned the Executive Secretary was to set up an employment service for members. The employment service called for very complete information on the education, experience, and qualifications of the members. This same information will serve the Society and the public in a variety of ways, some of which may have as much value as the employment service. In working out the questionnaire to be used, it became evident that many of the more experienced members would not care to give information that might indicate an interest in a change of employment. The idea of employment has, therefore, been divorced from the questionnaire to obtain a record of members. Interest in a change of employment will be shown on a separate form that will be very brief.

Care has been taken to develop a thoroughly satisfactory form for the record of members. It has been criticised by a number of members and is now in the hands of the Council for consideration. If approved, it will be sent out immediately to the membership.

MEMBERSHIP POSSIBILITIES FOR THE SOCIETY

The total membership of the Society on December 23, 1930 was 1,740, distributed as follows:

Fellows	11
Senior Members	708
Junior Members	949
Honorary Members	14
Corresponding Members	6
Associate Members	52
Total	1740

One hundred and seventy-nine members were added during 1930 including 170 Juniors, 5 Associates and 4 Honorary. We lost by death Professor A. K. Chittenden and N. F. MacDuff. Nineteen members were dropped for nonpayment of 1929 dues.

An analysis has been made of the foresters in the United States to determine the possibilities for increase in membership. This study revealed a

total of 1576 foresters considered eligible by responsible foresters who know them. Nine hundred and seventy-nine are graduates of forest schools. The others are employees of one of the several forestry agencies. These eligibles are picked from a list of approximately 3,200 foresters who are not members of the Society. More than 1,600 were rejected as ineligible.

The above information was obtained from a study of the graduate lists of the forest schools, including those graduating in June, 1929, and the lists of employees of the several forest agencies in the United States. These lists were checked against the Roster of October, 1929. The list of non-members in each school or forest agency was sent to the responsible head with a request that he indicate which men were in his opinion eligible. About one-half were culled out in this way. The remaining eligible men were sorted according to section. Cards giving the name and location of each man were then sent to the proper section for consideration. The parent organization did not attempt to recommend these men beyond a simple statement of the method used in obtaining the list. Endorsement of these men is considered the perogative of the section.

In the course of the above study an analysis was made of the percentages of graduates from each school that are members of the Society. These figures were sent to the schools for checking. Each school was asked to give information on the method used to interest its students and graduates in the Society. The response was most gratifying. A number of schools which had been inactive along this line designated staff members to work on membership among their graduates.

DELINQUENT MEMBERS

Members lose interest from time to time. Men who are elected to membership occasionally fail to accept.

After Miss Warren has tried several letters without success, the Executive Secretary has endeavored to determine the reason in each case. Friends of such members have aided to restore interest in the Society. The forest schools have aided in showing the value of membership in the Society. A number of valuable members have been retained in these ways.

SOCIETY EMBLEM

The Council on June 20 authorized the use of 10K gold in the emblem of the Society and reduced the price from $4.00 to $2.00. Since that time an effort has been made to advertise the emblem and urge its use. The office has sold 38 pins, including 22 Senior grade, 15 Junior grade, 1 Associate grade, as of November 30th.

The parent organization used a reproduction of the Senior emblem to ornament its stationery. At a suggestion from Major Guthrie this use of the emblem was brought to the attention of the Section Secretaries. Several have ordered dies at a reduced rate and will ornament their stationery with the emblem of the Society. In time these efforts will make the Society emblem better known than it is today.

CERTIFICATE OF MEMBERSHIP

Samples and cost data on a membership certificate for the Society of American Foresters has been submitted to the Council for consideration. Many prominent organizations have such certificates. The list includes the American Association for the Advancement of Science, the American Bar Association, and the American Society of Engineers. The proper display of the certificate of membership of the Society will add to the prestige of the organization and the individual member.

PHOTOS OF FELLOWS

Each Fellow of the Society has sent in a photograph to be retained in the permanent collection of the Society. These have been framed and now hang in the Society offices.

MEMBERSHIP PROBLEMS

Many problems in connection with election into the Society and advancement in grade have arisen from time to time. Failure of election, once an application reaches the Council is usually due to insufficient information. It has been possible to straighten out many such difficulties.

Question has been raised with regard to the qualification for Associate Membership. It is not quite clear whether some non-forestry graduates who are active in forestry work belong in the Associate grade because of their prominence or in the Junior grade because of their length of service. Again it is necessary to decide something definite on the constitutional requisite of being known "over a wide geographic range." The matter is placed before the Council.

There is a feeling in several parts of the United States that the policy of admitting men to the Junior grade in forestry should be a liberal one. This, of course, means different things to different men. Generally speaking, however, it is thought that Society membership should include men from the full "Field of Forestry" without preference to any given branch of the work. The "Field of Forestry" is considered by many members to include every field of endeavor that involves the management of the Forest. After discussing the matter with the several Council members, the Executive Secretary is of the opinion that the Council is as liberal as the membership generally. The same holds true from a study of the applications passed on during the past nine months. No rejections of Junior Members were made on the ground that a man's work was not forestry. There are, of course, members who can recall when certain branches of the "Field of Forestry" were looked upon by some members of the Society as not being true forestry. Society members who left to enter those fields were thought to have joined the "opposition." Again there were branches of the work closely correlating forestry and other fields of endeavor from which election to membership was difficult. The Executive Secretary is unaware of any objection from the Council to admitting members from any branch of the field of forestry. It is essential only that the applicant be fully qualified and properly endorsed.

ACQUAINTANCE WITHIN THE SOCIETY

The Executive Secretary has endeavored to become well acquainted with the members, the Section problems and the forest situation. This effort has caused him to visit the following sections and to attend the other meetings listed:

Meeting	Place	Date
Southern Forestry Congress	Memphis, Tennessee	April 9
Special Society Meeting (Ozark Section)	Memphis, Tennessee	April 9
Washington Section	Washington, D. C.	April
American Forestry Association	Minneapolis, Minn.	May 1
Research Conference, U. S. F. S.	Madison, Wisconsin	May 6
Opening Penn. Forest Research Institute	Mont Alto, Pa.	June 5
New England Section	New Haven, Conn.	July 15
Allegheny Section	College Station, Pa.	July 23
Southeastern Section	Tallahassee, Fla.	August
New York Section	Cortland, New York	Sept. 12
Northern Rocky Mountain Section	Missoula, Montana	Sept. 27
Washington Group, North Pacific Section	Seattle, Washington	Sept. 30
State Foresters Association	Portland, Oregon	October 1
North Pacific Section	Longview, Washington	October 2
California Section	San Francisco, Calif.	October 7
Intermountain Section	Ogden, Utah	October 10
Rocky Mountain Section	Denver, Colorado	October 13
Southwestern Section	Albuquerque, New Mexico	October 14
Ohio Valley Section	Chillicothe, Ohio	October 24

These trips have enabled the Executive Secretary to meet with one or more officers and members of every section. Section Meetings have been attended in thirteen sections. At twelve meetings the work of the Executive Secretary was discussed by him before the members in attendance. There was sufficient time at most meetings to permit him to have a personal visit with all, or nearly all, of those in attendance. Acquaintance with members of the Society has been very greatly increased.

The discussions at the meetings gave the Executive Secretary considerable information regarding many matters of interest in the work. They helped to an understanding of the task ahead of this office. They in turn permitted the Executive Secretary to clear up some local problems.

The Executive Secretary has also attempted to keep the membership advised of his efforts through the JOURNAL. Statements have appeared in the April, October, November, and December issues of the JOURNAL.

JOURNAL OF FORESTRY

Advertising.—The Council assigned the task of obtaining advertising for the JOURNAL to the Executive Secretary. Results to date are neither encouraging nor discouraging. Several new advertisers have been found but several former advertisers have dropped out temporarily. It is believed that the advertising can be gradually if somewhat slowly increased.

It is the opinion of competent advertising men that the JOURNAL should be able to obtain sufficient advertising to pay the cost of publication. To accomplish this will require considerable help from the members since the time and funds which can be used by the Execu-

tive Secretary for the work are necessarily limited. Advertising men have further suggested that a committee composed of one or more members from each section should be selected to help out with the problem of advertising. This is being considered by the Council. Further plans to develop the advertising include: building a file of possible advertisers, constant effort to interest the advertisers in the JOURNAL through letters, circulars, reprints, and an occasional call. A special circular setting forth the value of the JOURNAL as an advertising medium will be prepared. Finally, the help of the individual members will be continually sought.

Subscriptions.—The Executive Secretary has also sought to increase the subscription list of the JOURNAL. Results have been even less encouraging. A test letter to some twenty Louisiana Lumbermen who are doing some forestry work brought one subscription. A letter to nineteen state forestry departments which were not officially taking the JOURNAL brought another subscription. Letters to 65 schools and colleges including agricultural experiment stations not taking the JOURNAL officially gave us two subscriptions. And so on to a total of 250 letters sent and six subscriptions received.

Better luck was obtained in the effort to get student subscriptions. A letter offering the Journal at cost brought requests for 30 new subscriptions. There were already 30 student subscriptions from last year making a total of sixty altogether.

Plans are under way to make a circular setting forth the value of the JOURNAL as a technical publication. Some 900 of these will be sent through Prof. S. J. Record of Yale to a list of foreign foresters and forestry organizations. Other efforts to obtain subscriptions will be made. Again there is opportunity for the individual members to aid by sending the names of possible subscribers.

DINNER IN HONOR OF LATIN-AMERICAN FORESTERS

The Delegates to the Inter-American Conference on Agriculture, Forestry, and Animal Industry indicated so much interest in Forestry that Major R. Y. Stuart suggested a dinner in their honor. A formal dinner at the Cosmos Club resulted. It was attended by 62 persons including 27 foreign delegates from fifteen Latin-American countries, 27 Society members from Washington and four others interested in the Conference. The dinner was a real success. It was especially worthwhile since no other private social welcome was extended to these guests from the countries to the South. The Executive Secretary was greatly aided in the arrangements by Mr. W. R. Barbour of the Tropical Plant Research Foundation, Inc.

LEGISLATION

The Executive Secretary has endeavored to represent the Society on legislative matters at the National Capitol. At the request of persons interested in Forest Research and State Forestry work the Executive Secretary prepared a statement regarding appropriations that was sent to Arthur M. Hyde, Secre-

tary of Agriculture and another that was sent to Col. J. Clawson Roop, Director of the Budget in September. Illness prevented an appearance before the House Appropriations Committee in December. A few letters have been sent to men of influence to urge support of appropriations in Congress.

It is recognized that legislative efforts will become one of the most important functions of the office of the Executive Secretary. The Executive Secretary sought to learn the opinion of the Society with regard to participation in legislative matters during his visits to the sections. He found the opinion to be overwhelmingly in favor of active and vigorous participation where the Society had the facts to support its position. All efforts along legislative lines would, of course, be under the guidance of the Council. Efforts would be confined to matters on which there was substantial agreement.

OTHER MATTERS

The Executive Secretary has sought to inform himself on various legislative matters including the workings of the personal classification board.

He has sought to become acquainted with the representatives of other societies and organizations.

He has sat with the Committee on Policy of the Society of American Foresters when it was whipping the policy into shape.

He has worked with the Committee on the Annual Meeting.

He has handled many matters for the officers and members.

These and still other similar efforts do not lend themselves to report.

The above fairly well covers the matters worth noting on this occasion. It is hoped that the lines of effort will in some measure indicate the possible usefulness of the position of Executive Secretary.

The Executive Secretary wishes to express his sincere appreciation for the coöperation and helpful counsel that he has received on every hand during his service for the Society.

W. R. Hine,
Executive Secretary.

Resolutions

The following resolutions were approved:

THANKS AND FELICITATIONS TO MR. HINE

RESOLVED, That we, the Society of American Foresters, at our Thirtieth Annual Meeting, express to our Executive Secretary, Mr. W. R. Hine, deep appreciation for the untiring efforts which he has given the Society and which have contributed so largely to the prestige and growing activities of the Society.

We deeply regret that illness prevents his being with us at this time and we extend our sincere wishes for a speedy recovery.

UNEMPLOYMENT

WHEREAS, There exists in America a business depression which has caused wide spread unemployment, and

WHEREAS, There is much needed forestry work of long standing which could be done immediately on a large scale to the lasting benefit of the people of the various states.

BE IT RESOLVED, By the Society of American Foresters, that the State legislatures be urged to make available emergency funds for use on state-owned forest lands for the provision of additional fire lines, pruning and thinning of plantations, reforesting, and such other forestry work as would give employment to a large number of unemployed working men.

PUBLIC DOMAIN

RESOLVED, That the Secretary of the Society be requested to send to the Chairman of the President's Public Domain Commission, a copy of the paper prepared by State Forester, W. J. Morrill of Colorado, giving a summary of the view of many Western State officials, Foresters and others on the proper disposition of the unreserved public domain.

FOREIGN SERVICE

WHEREAS, Recent legislation authorizes the establishment of a foreign agricultural service under which it would be possible to send a forester abroad to keep in touch with European developments, as an aid in the upbuilding of American forestry,

NOW THEREFORE, Be it resolved that the Society of American Foresters go on record as being strongly in favor of such action.

EROSION CONTROL AND WATER CONSERVATION

WHEREAS, Very large and rapidly expanding public and private programs for flood control, river and harbor improvement, irrigation, power, municipal water supplies, etc., are being carried out in which their dependence upon forest and range cover is being largely or wholly disregarded, and

WHEREAS, Excessive damages of a widely diversified character from floods, the silting of streams and reservoirs, and the reduced productivity of forest and range soils is not being sufficiently or at all charged to the primary cause, the reduction of forest and range cover, and

WHEREAS, The availability of general facts only and the absence of detailed and localized facts has been one important reason why responsible public and private agencies and professions have disregarded the influence of forest and range cover in planning and carrying out public and private works, and in formulating forest and range policies, and

WHEREAS, Instead of the comprehensive national research program on erosion control and streamflow regulation on forest and range lands which is needed to furnish such facts the work actually under way by the Federal Government is less adequate than in any other phase of forest research,

NOW THEREFORE, Be it resolved that this annual meeting of the Society of American Foresters urges that an adequate program be provided through the addition of an appropriate section to the McSweeney-McNary Forest Re-

search Act, and requests that the proper officers of the Society take whatever steps may be necessary to this end.

GIPSY MOTH

WHEREAS, The abundance of a very serious pest in New England adjacent to the eastern border of New York State, constitutes a serious menace to our forests and woodlands, and

WHEREAS, Recent developments in the fight against this pest are first, an increase in infestation of the New England areas, and second, the appearance of a considerable colony on Long Island, and

WHEREAS, The extermination of the Long Island colony has had to be accomplished at the expense of deferring important control work in the so-called Barrier Zone area, and

WHEREAS, The amount of the Federal Gipsy Moth appropriation is insufficient to carry on adequate suppression work in the New England area,

NOW THEREFORE, Be it resolved, that the Society of American Foresters urges most strongly that Congress provide necessary increases in Federal appropriations for this work in the immediate future.

FLORIDA EVERGLADES

WHEREAS, The Society of American Foresters recognizes the need of preserving specimen areas representing primitive or natural associations of plant and animal life for forest research, the advancement of biological science and for education, and

WHEREAS, The Florida Everglades embraces sub-tropical conditions of plant and animal life not to be found elsewhere in the United States and therefore of National interest and importance for biological study and educational demonstration, and

WHEREAS, There is pending in the Congress of the United States legislation to authorize the Federal Government to accept upon donation lands within the Florida Everglades for protection and administration as a National Park,

RESOLVED, That the Society of American Foresters hereby expresses its approval of the preservation of a representative primitive area of the Florida Everglades as a national park provided the boundaries are drawn so as to include only areas of National Park significance and provided administration seeks to give the greatest possible protection to the primitive association therein.

PROMPT PUBLICATION

WHEREAS, The promptness with which the results of forest research are made generally available has a bearing of greatest importance on the rate and character of the development of forest practice in the United States, and

WHEREAS, The Federal Department of Agriculture is developing a large forest research organization,

NOW THEREFORE, Be it resolved that the proper officers of the Society be requested to urge upon suitable officials in the Department, the adoption of ways and means which will insure prompt publication of results and especially of progress reports.

WHITE PINE BLISTER RUST

WHEREAS, White pine blister rust has invaded the western white pine forests of Montana, Idaho and Washington, and has spread to the sugar pine region of southern Oregon thus threatening the large sugar pine stands of California, and

WHEREAS, This destructive disease can be effectively and economically controlled only by local eradication of currants and gooseberries in and adjacent to white pine and sugar pine stands, but to be effective, control methods must be applied before the stands become heavily diseased, and

WHEREAS, Western white pine is found to be so highly susceptible to rust infection that experts estimate that not to exceed ten years remain in which to apply control methods in Montana, Idaho and Washington, and

WHEREAS, The major acreage of the threatened timber is in national forests and the task of protecting these forests and adjacent state and private holdings within a short period of years is so great that it can be done only through aggressive action of the federal government in protecting its own timber and through government leadership in the protection of state and private timber resources,

NOW THEREFORE, Be it resolved that the Society of American Foresters urges upon Congress, the states and private owners such appropriations as will make possible immediate and adequate steps to control the disease, and believes that liberal appropriations for this purpose would be doubly valuable at this time in that they would give employment to large numbers of men out of work.

INDIAN FOREST LANDS

WHEREAS, Large areas of unallotted land within Indian reservations, now being administered under conservative forest management, do not have such legal status as to insure their continuous maintenance as productive forest properties or their sustained protection for soil and water conservation purposes, and

WHEREAS, It is believed that the permanent administration of such lands for purposes of forest production, soil protection and water conservation will best serve both the national welfare and the welfare of the Indians themselves,

THEREFORE, Be it resolved that the Society of American Foresters urges the enactment of federal legislation that will afford a definite legal status as "Indian Forests" for all unallotted lands within Indian Reservations that may be found to be primarily adapted to the production of forest crops, needed for purposes of water conservation, or essentially contributory to the prevention of soil erosion.

THANKS TO COLLINGWOOD

RESOLVED, That this meeting of the Society of American Foresters wishes to extend its hearty thanks to Mr. G. H. Collingwood and his Committee for the splendid arrangements made for the meeting.

APPRECIATION TO HOTEL

RESOLVED, That the Society of American Foresters, assembled in its Annual Meeting, wishes to express its appreciation to the Management of the Wardman Park Hotel for the many courtesies extended.

RESOLUTIONS COMMITTEE

H. WINKENWERDER,
J. A. FERGUSON,
E. O. SIECKE,
E. L. DEMMON,
C. M. GRANGER, *Chairman.*

REPORT OF THE SECRETARY-TREASURER

The financial records and assets of the Society of American Foresters were audited at the close of the fiscal year by a certified public accountant. His report covers the financial condition so thoroughly that there appears need of little comment.

Briefly the resources, as of November 30, 1930, total $42,054.25. Of that amount $30,097.00 is invested in high grade securities; $3,659.32 is in cash and $8,297.93 is in the form of office supplies, equipment and furniture, stock of Journals, Society pins, etc. Receipts for the year totaled $17,174.63, and expenditures, exclusive of the Executive Secretary's office, $16,904.12, a net gain of $270.51. The expenditures for the first eight months of the Executive Secretary project were $5,661.19. This approximates the estimates made for this activity. The sum of $18,868.98 has been pledged for support of the Executive Secretary project, and $10,880.02 has been collected. There has been disbursed during the year $11,917.62 for the Forest Education Survey. Assets of $13,759.84 remain for continuing that work.

The activities during the year exceed any previous record. This fact is reflected in the comparative statement of income, profit and loss. It became necessary to employ additional stenographic help as well as to provide additional office space to take care of the general growth of business. There has necessarily been an increase in the cost of the JOURNAL; likewise in the cost of miscellaneous printing, postage, general expense, and miscellaneous items. The latter includes an expenditure of $74.25 for a formal dinner given by the Society in honor of visiting foresters from the South American republics while they were in Washington in attendance at the Inter-American Conference on agriculture, forestry and animal industry.

While the auditor indicates that the value of the Society's investment in securities approximates $800 less than cost, mention of the fact should be made that a profit has been realized upon the securities that have been sold in addition to the interest obtained. It is not anticipated that any of our securities will be sold at the present unfavorable market prices. Meanwhile a fair rate of interest is being earned on our bonds.

An effort will be made to reduce the number of JOURNALS in stock. It is believed that there will be a greater demand in the future by the members and others for back numbers of the JOURNAL

to complete their library. Those who are in need of back issues are urged to purchase them at the earliest practicable date.

The Secretary and Treasurer wishes to record his appreciation of the assistance extended him by the Finance Committee, and Miss Warren, the Business Manager.

The report of Mr. Linzel, the accountant follows.

E. Morgan Pryse,
Secretary-Treasurer.

Comments on the Audit for the Fiscal Year

CASH IN BANK

The Washington Loan & Trust Company has sent me direct Bank Statements for the Society, the Forest Education Survey and W. R. Hine, Contingent Account, for the month of November, 1930. The Balance of Cash shown by the Bank Statements for the Society and for Forest Education Survey have been reconciled and prove with the respective amounts shown in the Balance Sheet. The Bank Statement for W. R. Hine Contingent Account showed a balance of $237.33. There has since been deposited $12.67 for Mr. Hine, which brings the Bank account into agreement with the amount of $250.00 shown on the Balance Sheet.

PETTY CASH

The Impressed Fund at the Washington Office was counted and $22.34 found to be on hand. A deposit of $10.75 is with the Post Office Department for possible deficiencies in Journal postage. The record discloses $3.06 in the hands of Mr. C. G. Bates for petty disbursements.

INVESTED FUNDS
INVESTMENTS FOR FOREST EDUCATION SURVEY

This account reflects the cost of Securities owned. Schedule "A" 1 lists the securities which were presented for my inspection by your Treasurer in the security vaults of the Washington Loan & Trust Company and is in agreement with totals shown in Balance Sheet. All coupons due have been clipped and accounted for. Due to the present financial situation, bid prices, November 30, 1930, for securities indicate a value for the Society's investments of approximately $800.00 less than cost. The bid price, November 30, 1930, for Investments of Forest Education Survey approximate the cost of these Securities.

JOURNALS IN STOCK

At November 30, 1929, there was reported to be on hand 14,872 Journals valued at $5,010.56, during the year 45 copies were purchased at a cost of $20.50. There were received from the printer 2,417 copies and from other sources 240, making a total of 17,574. Sample copies to the number of 802 were disposed of and 197 copies sold for $164.03. Receipts from the sales of Journals for 1929 totalled $293.58.

Sales of old Journals for the two years indicate that the value ascribed can only be realized over a long period of years; for that reason, the value of

the JOURNALS has been deemed *"Not readily realizable."* Particular attention is directed to this asset, since the value thereof is reflected in Surplus and should be taken into consideration when Surplus is drawn upon in carrying out the program of the Society, which, it is understood, contemplates the use of a large portion of Surplus in the next few years.

The sales of JOURNALS for the past two years have been applied against the value of JOURNALS in order to reduce same as far as possible and no adjustment has been made for the net increase in numbers, consequently the value shown November 30, 1930 is $4,867.03, representing 16,575 JOURNALS reported to be on hand.

OFFICE EQUIPMENT

It will be noted that there has been an increase in this account during the year of $594.85. Of this total $217.03 was the direct cost of furnishing the Executive Secretary's Office.

INTEREST RECEIVABLE

These accounts represent interest earned but not collected on Securities at November 30, 1930.

CUMULATIVE INDEX
OFFICE SUPPLIES
SOCIETY PINS

These accounts represent the cost of Cumulative Indexes, Office Supplies and Society Pins on hand at November 30, 1930.

PERMANENT SECRETARY FUND

As of November 30, 1930, there has been pledged for this fund a total of $18,868.98 and $10,880.02 has been collected as of that date. I am informed that the cost of maintaining the Executive Secretary's Office is estimated to be $30,000.00 for three years, and the Society is to meet, out of its funds the difference between the amount pledged and $30,000.00. Mr. Hine entered upon his duties as Executive Secretary on April 1 of this year and has consequently served eight months. It has, therefore, been considered logical to apply a proper proportion of the total pledged against the expense incurred. This proportion was found to be eight-thirty-sixth (8/36) equalling $4,193.11 and that amount was transferred from the Fund, leaving therein the sum of $6,686.91 as shown by the Balance Sheet.

It will be noted from the Income Statement that expenses allocated to the Executive Secretary were $5,661.19. This amount comprises Mr. Hine's salary, his moving expenses, salary of assistant from July to November and $200.00 for the rent of an additional room for his office.

To meet the deficiency resulting from this additional expense, excess earnings over deductions for the year in the amount of $270.51 were applied and it was necessary to draw upon surplus to the extent of $1,197.57 for the balance. The Society's contribution was, therefore, $1,468.08. In actuality the contributions is probably $700.000 larger, reflected in the increase in Postage, Printing, Office Supplies, Telephone and General Expense, which increase can only be approximated.

FOREST EDUCATION SURVEY

The transactions reported for this activity are detailed in Exhibit "C." The Balance of the Fund on hand at the close of the year is $13,759.84.

RESERVE FOR PERMANENT FUND

RESERVE FOR PERMANENT FUND INTEREST

The effect of these accounts is to specifically set apart from Surplus the amounts standing to their credit. The Reserve for Permanent Fund Interest has been increased $152.49 by a charge against income, which amount represents an average rate of interest, equalling 5.1 per cent earned by the Society on Invested Funds.

JOURNAL EXPENSE

There has been closed into this account proceeds from the sale of Reprints, since the cost thereof is reflected in Journal Expense. The same procedure is followed for 1929 in the Income Statement.

ADJUSTING JOURNAL ENTRIES

Heretofore, there has been submitted with the Audit Report a detail of the Journal Entries necessary to adjust and close the records for the year. They have been omitted in order to make the report more concise. However, I have personally supervised the placing of the necessary adjustments on the records and the closing of the books, so that they accord with this report.

COMPARATIVE BALANCE SHEET AND INCOME STATEMENT

It becomes possible to submit, for the first time, a comparative Balance Sheet and Income Statement. The captions of certain of the accounts have been changed to more clearly state their nature and make a proper comparison of Income and Expense for the years 1929 and 1930, which should be illuminating. A comparative statement could not be made for the Forest Education Survey because it has not been in operation two years.

ACCOUNTS AND RECORDS

The increased activities of the Society are reflected in the large volume of business transactions. A noteworthy addition and improvement to the records is the maintenance of a detailed record of each individual cash receipt.

The financial records are painstakingly kept and are in very good condition.

Minnesota Section Elects Officers

At its first meeting in the season 1930-1931, the Minnesota Section, elected Mr. R. N. Cunningham, Lake States Forest Experiment Station to serve as chairman and Mr. Raymond E. Stevens, Minnesota Land Economic Survey to serve as secretary and treasurer.

Comparative Balance Sheets November 30, 1929 and November 30, 1930

Assets	Year Ended Nov. 30 1929	Nov. 30 1930	Increase Decrease
Cash in Bank	$ 2,059.96	$ 2,404.25	$ +344.2
W. R. Hine, Contingent		250.00	+250.0
Petty Cash			
Washington Office	22.50	22.34	—.1
Post Office Deposit	13.36	10.75	—2.6
S. T. Dana	20.45		—20.4
C. G. Bates	5.00	3.08	—1.9
Invested Funds, per Exhibit A, 1.	15,806.37	18,022.00	+2,215.6
Investment for Prize Fund	991.50		—991.5
Accounts Receivable	292.72	293.97	+1.2
Interest Receivable	232.68	199.77	—32.9
[1]Journals in Stock	5,010.56	4,867.03	—143.5
Office Equipment	977.55	1,572.40	+594.8
Cumulative Index		416.40	—416.4
Office Supplies	129.24	131.62	+2.3
Society Pins	4.00	100.80	+96.8
Forest Education Survey			
Cash in Bank	1,782.19	898.77	—883.4
Petty Cash	80.54	30.39	—50.1
Dr. C. H. Guise		39.73	+39.7
Invested Funds per Exhibit A, 1.	22,359.35	12,075.00	—10,284.3
Interest Receivable	172.80	234.90	+62.1
Office Equipment	370.77	481.05	+110.2
Total Assets	$50,331.54	$42,054.25	$—8,277.2
Liabilities and Net Worth			
Accounts Payable, Society	$ 917.00	$ 62.74	$ —854.2
Membership Dues, 1930	88.50		—88.5
Dues Paid in Advance	74.00	128.00	+54.0
Subscriptions, Advance	11.00	41.54	+30.5
Reserve for Forest Education Survey	24,716.92	13,759.84	—10,957.0
Accounts Payable Forest Education Survey	48.73		—48.7
Permanent Secretary Fund	696.61	6,686.91	+5,990.3
Reserves:			
For Permanent Fund	2,990.00	2,990.00	
For Permanent Fund Interest	572.19	724.68	+152.4
For Prize Fund	1,500.00		—1,500.0
For Depreciation	194.99	336.51	+141.5
Surplus per Exhibit B	18,521.60	17,324.03	—1,197.5
Total Liabilities and Net Worth	$50,331.54	$42,054.25	$—8,277.2

[1] The value ascribed to "Journals in Stock" above, is not readily realizable.

Washington, D. C
Dec. 12, 1930

I have made an examination of the accounts and records of THE SOCIETY OF AMERICAN FORESTERS for the twelve month period ended November 30, 1930. The foregoing Balance Sheet and the accompanying Income Statement, in my opinion, correctly set forth the financial condition and result of operations for the fiscal year ended November 30, 1930.

Frank A. Linzel,
Certified Public Accountant (N. Y.)

Comparative Statement of Income and Profit and Loss Fiscal Years Ended November 30, 1929 and November 30, 1930

	Year Ended Nov. 30 1929	Year Ended Nov. 30 1930	Increase Decrease
Income			
Membership Dues Prior Years	$ 548.00	$ 419.34	$ —128.66
Membership Dues Current Year	11,303.60	11,891.96	+588.36
Journal Subscriptions Prior Years	15.50	4.00	—11.50
Journal Subscriptions Current Year	3,122.87	2,889.90	—232.97
Advertising	821.84	760.72	—61.12
Interest Earned	789.58	1,080.71	+291.13
Society Pins		13.35	+13.35
Current Fund Contributions	16.00		—16.00
Cumulative Index		114.65	+114.65
Gross Income	$16,617.39	$17,174.63	$ +557.24
Deductions from Income			
Journal Expense	$ 7,148.87	$ 7,724.35	$ +575.48
Postage	381.75	620.03	+238.28
Miscellaneous Printing	278.62	603.00	+324.38
Editor's Expenses		34.88	+34.88
Contributions to Other Societies		10.00	+10.00
Salaries and Wages	3,725.25	5,121.11	+1,395.86
Rent, Telephone	707.68	791.12	+83.44
General Expense	316.55	576.17	+259.62
Addressograph Expense	47.65	66.23	+18.58
Telegrams	57.94	129.84	+71.90
Commission & Exchange	16.42	14.45	—1.97
Travelling	107.48	180.92	+73.44
Office Supplies	231.19	317.96	+86.77
Depreciation on Office Equipment	108.17	141.52	+33.35
Multigraph & Mimeograph	158.93	251.04	+92.11
Annual Meeting Expense		73.51	+73.51
Cosmos Club Dinner		74.25	+74.25
Council Members Expense		21.25	+21.25
Permanent Fund Interest	143.16	152.49	+9.33
Deductions from Income	$13,429.66	$16,904.12	$ +3,474.46
Excess Income over Deductions	3,187.73	270.51	—2,917.22
Totals	$16,617.39	$17,174.63	$ +557.24
Executive Secretary Expense			
Salary, Including Stenographer, and Moving		$ 4,662.61	$ +4,662.61
Travel		998.58	+998.58
Total		$ 5,661.19	$ +5,661.19
Funds Transferred from			
Permanent Secretary Fund	$ 4,193.11		
Earnings	270.51		
Surplus	1,197.57	$ 5,661.19	$ +5,661.19
Analysis of Surplus			
Adjusted Surplus November 30, 1928		$15,333.87	
Earnings Fiscal Year 1929		3,187.73	
Surplus November 30, 1929		$18,521.60	
Less Deficit Fiscal Year 1930		1,197.57	
Surplus November 30, 1930		$17,324.03	

Forest Education Survey

STATEMENT OF RECEIPTS AND DISBURSEMENTS FISCAL YEAR ENDED NOVEMBER 30, 1930

Balance on hand November 30, 1929		$24,716.92
Interest Received		725.64
Interest Accrued		234.90
Total		$25,677.46
Disbursements		
Salaries	$ 8,775.04	
Travel	2,353.86	
Supplies and Printing	80.37	
Operating Expense	708.35	11,917.62
Balance Nov. 30, 1930		$13,759.84
Reflected as Follows:		
Cash in Bank	$ 898.77	
Petty Cash	30.39	
Dr. C. H. Guise	39.73	
Invested Funds	12,075.00	
Interest Receivable	234.90	
Office Equipment	481.05	$13,759.84

Schedules of Securities

	Par Value	*Cost*
Invested Funds:		
1 U. S. Gold Bonds 4¼s Registered J & D	$ 500	$ 500.00
5 U. S. Gold Bonds 4¼s 1952, A. & O.	500	500.00
1 Southern Pacific 4½s Gold 1968 M & S	1,000	1,003.75
1 Commonwealth of Australia 5% 1957—M & S	1,000	984.50
1 International Match S. F. 5% 1947—M & N	1,000	1,007.50
1 So. California Edison 5% Ref. Gold Bond 1951 J. J.	1,000	1,045.00
1 Mo. Pacific 1st Ref. 5% Gold, 1977, M & S	1,000	1,013.75
1 Erie R. R. Ref. Imp. 5%, 1977 M & N	1,000	982.50
2 Federal Farm Loan 4¼s, 1953 J & J	2,000	2,055.00
1 Wheeling Steel Corpn. 4½ Gold 1953 A & O	1,000	895.00
1 Kingdom of Norway 5% Gold, 1963, M & S	1,000	945.00
1 Penna. Co. 4¾ 1963 M & N	1,000	999.24
3 Mo. Pacific 4% Gold, 1957 M & S	3,000	2,415.00
2 St. Louis & San Francisco 4½s 1978 Gold M & S	2,000	1,867.50
1 American & Foreign Power Temp/Ctf. 5% 2030 M & S	1,000	880.00
11 Shares Penn. R. R. Common Stock	550	820.62
7 Shares Pennroad Corp.	no	108.00
Total Invested Funds		$18,022.00
Forest Education Survey:		
Federal Land Bank Bonds		
1 Springfield, Mass. 4¾ 1934-1954 J & J	$ 500	$ 495.00
2 Berkeley, Cal. 4½s 1933-1953 J & J	2,000	1,930.00
8 St. Louis, Mo. 4½s 1933—1953 J & J	8,000	7,720.00
1 Columbia, S. C. 4½s 1933-1953 J & J	1,000	965.00
1 New Orleans, La. 4½ 1933-1953 J & J	1,000	965.00
Total Forest Education Survey		$12,075.00

Progress Report
Forest Education Inquiry [1]

PRESENT STATUS OF THE INQUIRY

The Forest Education Inquiry, now being conducted by the Society of American Foresters under a grant of money from the Carnegie Corporation, was officially started July 1, 1929. During the year and a half that has elapsed, most of the data and information required have been collected and, in addition, considerable progress made with its compilation and analysis.

Every forest school in the United States and one in Canada have been visited for the purpose of securing detailed information, advice, and suggestions. There are one or two other Canadian schools to be visited prior to the completion of this study. Complete and cordial coöperation was extended everywhere. Desired information has been secured concerning policies and objectives, resources and financial support, student personnel, teaching staff, curricula, physical facilities, undergraduate and graduate teaching, research activities and the occupations of the former graduates.

In addition, conferences and interviews were held with numerous foresters, employers of foresters, men prominent in the forest industries, bankers, college administrators, teachers in fields related to forestry, and others who might be expected to contribute to this study.

Questionnaires were mailed to 4,887 former forest school students. A return of 2,657 (54 per cent) was received. All of the data contained on the returned questionnaires have been tabulated and analyzed. Mention should be made of the excellent spirit shown by the foresters and the efforts made in supplying information. In many cases additional material was appended in order that a more detailed presentation of the individual's ideas might be made. Personalities were almost entirely avoided, though many did express themselves with vigor and energy.

Satisfactory progress has been made along all lines leading to the preparation of the final report. It is expected that this will be completed during the coming summer.

The collegiate system of forest education in the United States has been in existence for thirty-two years. During that period twenty-nine schools have been established. Twenty-five still exist. Two of the twenty-five schools are on a graduate basis. Of the other twenty-three, but five make any appreciable effort to develop graduate training in addition to undergraduate, although there is scarcely one of the institutions at which graduate work in forestry leading to some form of an advanced degree is not possible.

In 1900 there was one forest school graduate in the United States; in 1929, 283 received undergraduate degrees; in addition, approximately 100 received advanced degrees. Of the latter, 80 per cent had continued their studies after having completed the conventional four-year course in forestry. The undergraduate enrollment last year was 2,-

[1] Presented at the 30th annual meeting, Society of American Foresters, December 29-31, 1930, Washington, D. C.

071; this year it is slightly higher, or 2,160.

The total number of men who have graduated from forest schools in this country is well over four thousand. Over 3,800 undergraduate degrees and over 1,000 advanced degrees have been conferred. Approximately 2,600 men are now in forsetry or in occupational fields closely allied therewith.

There is every reason to believe that there will be but little if any increase in the number of forest schools. In fact it is possible that readjustments will occur in the future which will cause some decrease in the number of schools offering full professional training. Changes of this kind will be slow and will be associated closely with occupational demands in forestry and the success or failure of the forest school in meeting these. The gradual demand for higher professional standards, political exigencies, the decline in enrollment in agricultural colleges, the problem of public support, the connection with land-grant colleges, the institutional organization of the school itself, and administrative relationships between forestry and other units in the respective colleges and universities, are all factors that will have a direct bearing on the future development or curtailment of the system of professional forest education in this country.

Regardless of any change in the number of schools, it seems inevitable that the time will soon come when each of our schools must clearly recognize, define and perhaps limit the type of training which it can provide most effectively in view of the resources, equipment and facilities that it possesses. The increasingly exacting demands of a developin profession will create a pressure tha will make no other course possible. Th schools that cannot secure the resource required to provide professional trai ing will undoubtedly be compelled t readjust their occupational objectives.

Were time available, it would be c interest to present some of our data re ative to the quality of students in th schools, objective information concern ing the teaching staffs, occupationa data dealing with forest school grad uates, the earnings of foresters, an numerous other phases of the Inquiry These, however, must await later pres entation.

Nevertheless, it is worth while wit the few minutes allotted to me, to com ment on one or two conditions that affec fundamentally our system of profes sional education. In addition, a brie summary of the opinions expressed i the questionnaires returned by fores school graduates may be of interest.

There are many detailed problem which are confronting the forest schools but one in particular stands out,— problem that is disconcerting and whic vitally affects many others. Many ad ministrators in colleges and universitie with which forest schools are associate do not regard forestry as a well-define profession, nor their forest schools a professional units in need of additiona support in order to meet any particula standards. They are more inclined t regard forestry as a name covering a miscellaneous aggregation of occupa tions and the school of forestry in the light of an ordinary college department The student may come to the fores school, learn what he can in view o

existing facilities and then find work which may be available as a result of the extent of training received. The implications are far reaching. Unless the professional status of forestry and the necessity of an adequate type of training therefor are recognized, it is going to be very difficult for many of our forest schools to improve materially their existing situations.

It is extremely simple to show how this attitude affects our professional schools. Obviously no educational unit can function with much success unless it is reasonably well financed. In fact, were ample financial resources provided and were details of wise educational policy and objectives carefully worked out and adhered to, the other problems of forest education would soon become insignificant.

Of the twenty-five forest schools in the United States, but six may be said to be adequately financed. Ten operate on annual budgets that are very small and altogether insufficient. The other nine receive amounts which may be termed irreducible minimums. Yet, with several exceptions, most of the schools are attempting to teach the same curriculum and prepare men for the same professional field.

It scarcely seems necessary to expand this point. For example, two schools exist; one receives $40,000 and has a faculty of six or seven men; the other operators on a budget of $12,000 and has a teaching staff of two men, or possibly three. Yet each aims to provide instruction in the same subjects, and train for the same field. At the school with a small faculty, each instructor is forced to carry a heavy teaching load, distribute his efforts over a wide range of highly specialized subjects, and forego the opportunity to engage in productive research or other constructive work in lieu thereof.

How effective can a man's teaching be when he covers during the year—Dendrology, Silviculture, Wood Identification, Products, Mensuration, Logging, Forest Improvements? Yet these seven fields constitute an actual teaching program. Other programs, equally diversified, might be cited. Here is a list of subjects which for the most part are unrelated and which should belong properly to the fields of at least three instructors. Nor are teaching programs of this character confined to those schools where financial backing is most restricted. In some of the better financed schools, schedules of unrelated subjects are all too commonly assigned an instructor, regardless of his special training, experience and inclination. The issue goes beyond that of an inadequate budget. If our forest schools are to gain the recognition as professional educational units which they should have, but seldom do have at present, a change in point of view will have to be made. Adequate teaching staffs, composed of authorities in individual fields or certainly closely related ones, will be required. The time is past when a forester, primarily by virtue of his general academic training, can teach any subject in the curriculum. In no other type of professional or technical school would such a distribution of teaching effort be expected or even tolerated. In medicine, law, engineering, agriculture or science, an instructor confines his efforts to one field or a small division

thereof. Why should he not do so in forestry?

This situation is not without recognition. A few forest schools have taken this problem in hand and adjusted carefully the teaching programs of their individual instructors, with due recognition to time for research or other stimulating and productive activity. However, a majority of the schools have a long way to go, and while it is easy to point out the problem and its solution, its actual correction is another matter. The first step is adequate recognition of the place of the forest schools by those at the colleges who direct and manage the fiscal policies. This will be by no means the solution unless it is accompanied by constructive action, but the two together, with a well formulated school policy, should strengthen many elements of our educational system which are now very weak.

In the questionnaires which were returned, numerous constructive suggestions were received relative to the improvement of our educational system. While opinions covering many of the various phases of forest education were offered, the majority concerned themselves with three principal issues:

1. The need for a better basic education, with more attention to the liberal and humanistic subjects.

2. A more thorough training in economics.

3. Increased effort to provide specialized training.

But few suggested any increase in the technical content of their forest school curricula. In each case an issue of the greatest importance is raised. Each goes far beyond forestry and is intimately associated with certain broad, underlying principles of education that affect all fields of professional preparation. From the start of this study these topics have been recognized and will be covered fully in the Inquiry's report.

There is considerable disagreement over the time and subject matter required to provide the basis for a sound and liberal education. In this country the conventional four-year liberal arts course was supposed to supply this. At present the trend is toward the Junior College, a unit in which the basic education is completed by the end of the sophomore year. Regardless of the individual's opinion of the Junior College and its aims, its rapid development and acceptance must be recognized. The time is probably not far away when the undergraduate forest school curricula will have to be adjusted to the programs of this new educational unit.

Desirable as a four year liberal arts education is, it would be impossible to set this up as a definite requirement for entrance to the forest schools. There is every indication that the number of men with the Bachelor of Arts degree entering the forest schools will be in the future, as it is today, extremely limited. On the other hand, the principle of the Junior College, which provides for the equivalent of two years of general education, has already been accepted at four or five institutions at which forest schools are located and there can be little doubt but that it will soon spread to others. When such universities as Wisconsin, Chicago and California, among others of national prominence, accept this principle, as they have, there

need be little doubt but that it is educationally sound.

To ascertain the extent to which the offerings of the forest school conform to those set up by the Junior College, an analysis was made of the curricula of the twenty-three undergraduate schools. In general they measure up fairly well with respect to the quantity of work demanded. Three schools provide for the complete equivalent of two years of college work at the Junior College level; all but one provide for over two-thirds of this amount. From the standpoint of actual subjects, however, the programs are not well balanced. The preponderance of work in biological and physical science has apparently prevented the inclusion of history, social science and modern language. But five schools require work in history, or government, but one in social science and but two in modern language. Five schools fail to require work in fundamental and general economics.

The almost universal desire for more adequate training along economic lines must be recognized; yet this presents a problem that is difficult of solution. The economic subjects emphasized are primarily those of an applied character; for example, accounting, business law, business organization, public and corporation finance, transportation, labor and personnel problems and others. That many of these subjects will be of great value to the forester is admitted, but whether or not a few extra formal courses will make up the deficiencies that apparently exist in this field is none too certain. There is no question but that the economic phase of the forester's training must be strengthened, for economic relationships govern and control practically every activity with which the forester in industrial employment is concerned, and a great many of those with which the forester in public service has to do. Natural science and engineering furnish the knowledge underlying the technique of the forester, but the course of action and development of policies are guided primarily by the underlying and pertinent principles of economics and the other social sciences.

The demand for specialized curricula is also very insistent. As a matter of fact, there need be no additional subjective division of forest school curricula. Each of the twenty-five schools offers technical training for the general field of forest production and management. The majority regard this as their principal objective. Nine of these twenty-five schools offer nothing beyond the curriculum in general forestry, a fortunate state of affairs since with possibly one exception, these schools are too inadequately financed or equipped to do more. Each of the other fourteen schools offers the opportunity for concentrated effort in two or more fields. In few cases are undergraduate curricula leading to specialization built from the ground up. They are usually composed of formal courses selected here and there from the college or university catalog, a scissors-and-paste-type of effort which must cause a great deal of waste and inefficiently used time on the part of the student. From the suggestions received, there is every reason to believe that much of the specialized training offered in the past has not been particularly successful. In any event there is no reason for additional schools

to attempt to offer opportunities for concentration of training. In fact, a few of them might examine their objectives and see whether or not they are now giving the work they can most advantageously offer.

The subject of concentration of training in undergraduate curricula needs careful handling. Disregard of established principles of education will do more harm than good. Unless properly worked out as to time, scope and suitable college offerings, the result will be only a training of the most superficial character.

A small number of foresters still suggest a training of the most practical kind. It scarcely seems necessary to state that instruction given at a forest school must conform to the sound educational policies that exist at our colleges and universities. This fact is often overlooked. If forestry demands of the young college graduate a great amount of woods training and experience, then another type of school will have to be developed.

It is not to be inferred that the forest schools cannot improve greatly the technique of effective instruction, but one must not lose sight of the primary functions of the college and university and the necessity of conforming to their standards. The college cannot offer a training of trade school level. Were the collegiate forest school to provide a training of that grade, the descent of forestry to a semi-professional status would be inevitable.

Conclusions

In conclusion, it should be emphasized that this study was initiated with a view to improving our system of forest education. It is relatively simple to point out many elements of weakness, but a critical study without constructive recommendations would scarcely justify the effort involved. Our educational structure is only thirty-two years old and its accomplishments in that brief period have been remarkable. Yet there is room and necessity for extensive development and improvement. We desire to see our schools accorded general recognition as units of true professional grade. In general, to gain this recognition, aims and policies must be more clearly recognized, defined and provided for, existing defects corrected and standards raised. Frank recognition of the status that our educational system occupies today is essential and the first step in further progress.

C. H. Guise,
Assistant Director,
Forest Education Inquiry.

Report of the Editor

Having discussed a number of Journal of Forestry matters in the November, 1930 issue under the title of "A Chat with the Editor" this report will bear only those points requiring emphasis.

The present editor took charge with the October, 1930 issue. At the same time a change was made in printers. The Journal is now printed by the Monumental Printing Company of Baltimore, Maryland. The great distance between printer and editor has resulted

in some embarrassing situations and in some changes not originally intended. The change however, will result, it is hoped, in a monetary saving which can be expended upon such improvements as the addition of illustrations.

Several changes have taken place on the editorial staff. The elevation of the present editor from the staff necessitated his replacement in the wood technology and utilization department. Mr. Arthur Koehler of the Forest Products Laboratory was appointed to take charge of this field. Pressure of other duties prompted Mr. Ward Shepard and Mr. E. O. Siecke to resign. Mr. Paul A. Herbert of the U. S. Forest Taxation Inquiry was appointed to succeed Mr. Shepard and he has entered upon his duties with characteristic interest and energy. Professor Burt P. Kirkland of the University of Washington was appointed to succeed Mr. Siecke. His duties commence formally with the January issue.

The editorial staff has materially lightened the work of the editor-in-chief by editing manuscripts, in some cases conducting correspondence with authors, in others in seeking reviews and in general advising the editor in policy matters.

Volume 28, published in 1930, included the usual eight numbers, but ran to 1200 pages—one of the largest yet published by the Society. This volume is characterized by a heavy percentage of papers dealing with forest policy. This came as a result of the considerable volume of material submitted in competition for the Pinchot prize for the best paper devoted to a solution of the forestry situation. However, there were also, especially in the May issue, a number of excellent papers on game management, and the relation between game and forestry and recreation. This is an indication of the growth of these fields and their importance in forestry work. Matters concerning forest soils and soil management received more than the usual attention in articles, reviews and notes, indicating the increased interest in and attention to this important fundamental field. The field of forest utilization also received more than the customary attention and indicates that those interested in it are becoming either more articulate or more conscious of the intimate relation between the growing of trees and the utilization of their wood. If any major field has not been given attention commensurate with its importance or in harmony with that accorded the departments just mentioned, it is only because the contributions have been few. As long as the editor must depend in large part upon voluntary contributions, the JOURNAL will reflect that fact not only in quality of contributions, but in the balance it is able to give each volume. *The editor cannot publish what he hasn't got,* and any criticism of a lack of balance between the papers in the various fields should be directed less to the editor than to those interested in the fields that are not adequately represented. It should always be remembered that the JOURNAL OF FORESTRY is the only technical and professional forestry magazine in this country and that it must cover a very wide and miscellaneous field with consequent difficulty in arriving at a just balance. The editor and members of his staff intend to solicit papers from

persons who should be able to make worthwhile contributions in order to work up to a balanced magazine each month with a maximum field of interest and service. Occasionally it is desirable to stress a certain field in a single issue, as was done for example for game in the May issue. Such a concentration has arguments in its favor as well as against it. It does emphasize suddenly a certain field and it makes for better reference and filing; on the other hand it is considered by some as providing an indigestible single dose for those interested and an almost useless copy for those not so interested.

Some criticism has been directed to the preponderance of papers of an academic nature and those on pure research. If this criticism is just, it is largely the fault of those who fail to contribute practical material. At the present stage of our professional development we have a large number of members who are concerned with the homely every-day problems of forest practise and administration who should be able to contribute frequently for the benefit of others in similar work. Be it only an improved transplant board, a planting machine, the organization of planting or fire fighting crews, a new type of wood-saving or cost-reducing saw mill equipment, a new idea in selective logging or even the attitude toward forest personnel by an experienced administrator, its presentation in printed form would be most welcome to the practitioner. During the past three months many letters have been received indicating that readers are "fed up" on academic discussions of forest policy, that they want something more cheering and more useful and that they look to the JOURNAL for suggestions on how they can do their daily forestry work better. The JOURNAL is not a commercial magazine, but the official organ of a professional and technical society. It is not only a mouthpiece, but also a medium of exchange for ideas bearing on practise. The JOURNAL reflects the status, progress and attitude of mind, as well as the deficiencies of the forestry profession, and members more than the editor have it in their power to make it the leading and most helpful magazine of its kind in the world. Each member should consider it his duty to see that his own forestry accomplishments and those of others in so far as they have a wide application come before the profession. Attention is called again to the reports of Professor S. T. Dana, the past editor-in-chief, and to the present editor's note in the November issue concerning the character of the JOURNAL.

In conclusion, the editor wishes to record his pleasure over the great interest taken in the JOURNAL by many members and his gratitude for the help rendered by the executive secretary, Mr. W. R. Hine; the business manager, Miss L. A. Warren; his own secretary, Mrs. L. H. Johannsen; and members of the editorial staff.

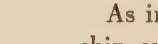
EMANUEL FRITZ,
Editor-in-chief.

SECRETARY HINE ON FURLOUGH

Illness prevented Executive Secretary W. R. Hine from participating in the

Annual Meeting which he had so ably planned. Mr. Hine met a few of the members in the lobby of the hotel, but in order to conserve his strength he spent most of the time at his home. Following action by the Society Council, Mr. Hine was given a three months' furlough.

Immediately after the close of the meeting, Mr. Hine went to the Mont Alto Veteran's Hospital in Washington, D. C., for treatment and diagnosis. On January 14 he was transferred to the Veteran's Hospital at Oteen, North Carolina, where he will remain for several months. His illness appears to be the culmination of a long period of suffering, during which he has attempted to carry on his work. There is every reason to believe that the treatment and rest afforded at the Oteen Hospital will result in a permanent recovery. In the meantime, the work in the Society office is being carried forward by Miss Audrey Warren and her staff, aided by frequent conferences with President Redington.



For the Year 1931

A Reconsideration of Ideals

When King John took his long stride, centuries ago, and established a unit of linear measurement, he did more than take a step. It matters but little to us, now, how carefully the pace of the gruff old King was measured. Neither are we concerned with the method of maintaining under all conditions the accuracy of the first measurement. Certainly, the subjects of King John had *one* standard to guide them.

This old legend is only suggestive. Probably the successor of King John had no use for the standard. Certainly many standards have been set up and thrown aside since his day. In our day standards are recognized in all the broad fields of human endeavor.

The United States government maintains a Bureau of Standards. At Paris in France the "perfect meter" is carefully kept under uniform conditions, and all others are copies of it. The civil engineer makes corrections for temperature and tension when the measurement must be accurate, and when the value of a front foot runs into five figures, fractions have a meaning. Just a wee decimal point, misplaced, caused an error and wrecked the new bridge when the test engine was put on it. Whatever else may be said of, or for a standard, it does indicate to him who cares to compare, how far short of the standard a given unit or individual project may be.

Forestry has its standards.

As in other fields of human relationship and endeavor, so among foresters some standards are not universally held in high esteem. The "Normal Forest" is too hypothetical for some. Others think it fanciful, impractical. Because it is impossible of attainment, still others would completely ignore it. Nevertheless, it does serve as a standard by which to measure attainment in forestry practice.

There are timberland owners who because they pay a few cents per acre to an association for fire protection, would

welcome recognition as among those owners now practicing forestry on their holdings. The owners who piles and burns brush on cut-over land would offer that effort as a password to the circle of practical foresters. Others would ruthlessly cut an area and then trust to fire protection and the prodigality of nature to make good their boast that "a stand will come back soon." No matter what the shibboleth of the timber land owner may be, still the Normal Forest stands as the standard by which to judge the degree of the management employed on any area, privately or publicly owned.

It is not pertinent to this note to discuss the economic hindrance to forest management. That the Normal Forest ideal was conceived and born within the cubical confines of an office given over to fine mathematical computations is not a defense. The Normal Forest needs emphasis, to the end, that foresters may not blind themselves to the defeciencies of the areas under their control. Neither should foresters in their splendid enthusiasm of "practical forestry" lead owners, private, state or national, to think that forest management is being practiced on an area, when all the owner may be doing, e.g., is giving the area a first-rate fire protection.

The Normal Forest *is* an ideal. It *is* rigid. It *is* impossible of full attainment. Yet the Normal Forest ideal, when adhered to may so raise the quality of various practices in our country as to change the whole face of the forestry movement. That is the function of an ideal. An ideal beckons on to higher planes. Ideals must deal in seeming and even absolute impossibilities. Therein lies their value. The Normal Forest ideal has the "hint of the hills" about it.

Certainly some will scoff. Scoffing is mute evidence of another value of an ideal — it separates the practioneers of any profession or business into groups. Little wonder that the ideal of the Normal Forest can make much headway when men in positions of leadership sport the idea of the normal yield table and the possibility of a normal stand of any species. The practical man of affairs—"hard-boiled timberland owner"—is not won to the value of the practice of forestry by any equivocation as to what is being accomplished on his timberlands. Permanent advance, regardless of the field of human endeavor, has always been in the sphere of the ideal. The impossible challenges the man who holds on. The supporters and followers of great movements of history did not turn back in the face of seeming failure. The goal was only made more clear.

This is not a call to a crusade. It is not meant for a preachment on ideals. Rather it is meant to raise the question in the mind of the reader as to the value of an ideal and of the Normal Forest ideal in particular.

There is a feeling, among those who blazed the way in forestry in the United States, almost akin to anxiety, regarding the future leadership in forestry. Are those who follow going to capitulate to the materialistic philosophy of the day? Do they dare challenge the strongholds of opposition with an idealism that has a "glint of gleam" about

it? There is no doubt but that ideals had full sway, in the formation and foundation of forest policies in the United States. Certainly the leaders made mistakes in plans and execution. All *leaders* do. The ideal so gripped the imagination and so dominated the thinking that practice lagged. Yet that is neither a criticism of the ideal nor of the idealist who would put it in practice.

The cold cunning calculations of war, with all their ruthlessness have a place for ideals. Witness the defender of Paris, Galliéne, in 1914 "with the German troops outside the gates of Paris." Although his plans of defense were complete and all that man could do had been done, he realized that Paris needed something more than men and machines to steady her. Ambassador Herrick was invited to take a ride, ostensibly to see the arrangement for the defense of Paris; in reality that the war-torn, nerve-racked people of Paris might see in the calm, poised personage of the Ambassador of the United States of America the personifications of an ideal, a strength, a defense not swept into oblivion by powder and steel.

It is a far cry from the tense times of war to the mad scramble for dollars in the trying field of economic stress. Forestry practice has no room for a dreaming sentimentalist. Nevertheless, wherever the strain, whatever the problem, there is a place for an ideal. Forestry has ideals. Forestry in the United States must be kept to its ideals.

Dwight S. Jeffers,
Iowa State College.

FORTHCOMING EVENTS

Annual Meeting
Pacific Coast Forestry Conference
(Western Forestry and Conservation Association)
March 19, 20, 21, 1931
Davenport Hotel, Spokane, Wash.

Third Soil and Water Conservation Conference, June, 1931
Fayettesville, Ark.

American Forestry Association
June 2-4
Grove Park Inn, Asheville, N. C.

Section Meetings
Allegheny Section
Society of American Foresters
February 27 and 28
Harrisburg, Pa.

Section secretaries are welcome to use this box for announcing their meetings. Copy should be in the hands of the Editor or Executive Secretary one month before date of publication.

Denver Section Holds Large Meeting

An open dinner meeting of the Rocky Mountain Section of the Society of American Foresters was held at Denver the evening of December 10. This meeting was notable in several ways. There were 100 persons present, the largest number, so far as is known, that has ever attended a meeting of this Section. A large number of students and some of the faculty from the forest school of the State Agricultural College at Fort Col-

lins were present, as well as representatives of the State Forestry Association, the Colorado Association, Denver Chamber of Commerce, National Park Service and the U. S. Biological Survey. The President of the Society, Paul G. Redington, was the guest of honor and made a very interesting address.

Mr. M. W. Thompson, of the Regional Office of the Forest Service, Denver, covered exhaustively the subject of Colorado spruce for pulpwood, now a matter of great interest because of the recent sale of spruce to the International Paper Company on the Rio Grande and San Juan national forests.

Mr. John W. Spencer of the Regional Office outlined the Society's plan for organization of federal conservation agencies.

Wilcox Active in Central States Forestry Congress

No small measure of the success of the recent gathering in Indianapolis of the Central States Forestry Conference was due to Mr. R. F. Wilcox, State Forester of Indiana and a Senior member of the Society. His interest and activity secured excellent support from the press of Indianapolis and adjacent cities. The meeting was given front page space in several of the Indianapolis papers and stories relating to the meeting were carried over a period of several weeks before and after the Congress. A report of the meeting of this new agency appears on another page.

Announcements of Candidates for Membership

The following names of candidates for membership are referred to Junior Members, Senior Members, and Fellows for comment or protest. The list includes all nominations received since the publication of the list in the January Journal, without question as to eligibiliy; the names have not been passed upon by the Council. Important information regarding the qualifications of any candidate, which will enable the Council to take final action with a knowledge of essential facts, should be submitted to the undersigned before March 16, 1931. Statements on different men should be submitted on different sheets. Communications relating to candidates are considered by the Council as strictly confidential.

FOR ELECTION TO GRADE OF JUNIOR MEMBER

Name and Education	*Title and Address*	*Proposed by*
Balizet, Clarence Edward N. Y. State, B. S. F., 1930.	Graduate work, N. Y. State College, Syracuse, N. Y.	New York Sec.
Berriman, R. C. M. Grammar and High School.	Ranger, Eldorado Natl. Forest, Georgetown, Calif.	California Sec.
Buenger, Clarence Carl Univ. of Mich., 2½ years.	Supt. of Parks, Sheboygan, Wis.	Wisconsin Sec.
Caldwell, John H. Cornell, B. S., 1928.	Asst. Forester, Letchworth State Park, Castile, N. Y.	New York Sec.
Delaney, Frank B. Grade School.	Ranger, Plumas Natl. Forest, Blairsden, Calif.	California Sec.

Name and Education	*Title and Address*	*Proposed by*
Holcomb, Harry W. N. Y. State Ranger School.	Blister Control Agent, Peru, N. Y.	New York Sec.
Diebold, Charles Harbou Cornell, B. S., 1930.	Assistant Soil Surveyor, Dept. of Agronomy, Ithaca, N. Y.	New York Sec.
Dooley, Fred J. Grammar School.	Lumberman, U. S. Forest Service, Alturas, Calif.	California Sec.
Fatzinger, Richard P. Penn. State, B. S. F., 1927.	Blister Rust Control Agent, Brockway, Pa.	Allegheny Sec.
Freeman, John R. Univ. of Calif.	Technical Assistant, University of California, Berkeley, Calif.	California Sec.
Friedhoff, Wm. H. Colo. School of Mines, E. M., 1907.	U. S. Forest Service, San Francisco, Calif.	California Sec.
George, Ernest J. Univ. of Minnesota, B. S., 1928.	Agent, Northern Great Plains Field Station, Mandan, N. D.	Minnesota Sec.
Hoffman, George C. Cornell, B. S.	U. S. Forest Service, Elmira, N. Y.	New York Sec.
Houghton, Charles E. Cornell, B. S., 1927.	Foreman, Finger Lakes States Parks Commission, Ithaca, N. Y.	New York Sec.
Kase, John C. Penn. State, B. S. F., 1929.	Asst. Forester, Bald Eagle State Forest, Mifflinburg, Pa.	Allegheny Sec.
Maine, Reuben B. New York State, B. S., 1920.	Amer. Creosoting Co., Bogalusa, La.	Gulf States Sec.
Mattison, Charles Wesley Cornell, B. S., 1928.	Forester, Jefferson County, N. Y., Watertown, N. Y.	New York Sec.
Mendenhall, Wm. V. High School	Forest Supervisor, Angeles National Forest, Los Angeles, Calif.	California Sec.
Neetzel, John Raymond Univ. of Minn., B. S., 1929, Univ. of Calif., M. S., 1930.	Lake States Forest Experiment Station, St. Paul, Minn.	Minnesota Sec.
Percival, Warren E. Univ. of N. H., B. S., 1929.	Brown Co., Berlin, N. H.	New England Sec.
Putman, J. A. Univ. of Mich.	Thistlethwaite Lumber Co., Opelousas, La.	Gulf States Sec.
Russell, Paul H. Penn. State, B. S., 1930.	Asst. Forester, Department of Forests and Waters, Milroy, Pa.	Allegheny Sec.
Schrader, George R. Hamilton College, N. Y. State Ranger School.	Ranger, U. S. F. S., Weaverville, Calif.	California Sec.
Segraves, William Boldry Penn. State, B. S. F., 1927.	Asst. Forester, Department of Forests and Waters, Clearfield, Pa.	Allegheny Sec.
Standing, Arnold R. Utah State, B. S., 1929.	U. S. Forest Service, Ogden, Utah.	Intermountain Sec.
Strait, Harrison G. Special Agricultural Course, Cornell.	Blister Rust Agent, Conservation Department, Albany, N. Y.	New York Sec.
Vetter, Victor P. High School.	Ranger, Santa Anita District, P. O. Via Sierra Madre, Calif.	California Sec.

FOR ELECTION TO GRADE OF SENIOR MEMBER

Apgar, William B. Cornell, B. F., 1921, M. F., 1922. (Junior Member, 1924)	Forester, Nebraska Natl. Forest, Halsey, Neb.	Central Rocky Mt. Sec.
Cochran, William F. Forest Service Courses. (Junior Member, 1927)	Forest Ranger, U. S. Forest Service, Colorado Springs, Colo.	Central Rocky Mt. Sec.
Darley, William M. Colorado College. (Junior Member, 1927)	Forest Ranger, U. S. Forest Service, Monte Vista, Colo.	Central Rocky Mt. Sec.
Fay, William B. 1 year Mechanic Drawing, 1 year Shop Work. (Junior Member, 1926)	Assistant Supervisor, Holy Cross, Glenwood Springs, Colo.	Central Rocky Mt. Sec.
Mack, Charles B. High School. (Junior Member, 1926)	Forest Supervisor, Cochetopa Natl. Forest, Salida, Colo.	Central Rocky Mt. Sec.
Stephens, Raymond D. Univ. Minn., B. S. F., 1921.	Eastern Mfg. Co., Bangor, Maine.	New England Sec.
Webber, Marion J. State Normal S. D. (Junior Member, 1927)	Ranger, Harney Natl. Forest, Custer, S. Dakota.	Central Rocky Mt. Sec.

FOR ELECTION TO GRADE OF ASSOCIATE MEMBER

Randall, Charles E. Leland Stanford, A. B., 1920, Oregon Agricultural College, George Washington, M. A., 1930.	Editor, U. S. Forest Service, Washington, D. C.	Washington Sec.

W. G. HOWARD,
Member of Council in Charge of Admissions.

SOCIETY OFFICERS

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President, PAUL G. REDINGTON, Biological Survey, Washington, D. C.
Vice-President, JOHN D. GUTHRIE, Forest Service, Portland, Oregon.
Secretary-Treasurer, E. MORGAN PRYSE, Office of Indian Affairs, Washington, D. C.

Executive Council

The Executive Council consists of the above officers and the following members:

	Term expires		Term expires
R. Y. STUART	Dec. 31, 1931	CLIFTON D. HOWE	Dec. 31, 1933
ALDO LEOPOLD	Dec. 31, 1931	STUART B. SHOW	Dec. 31, 1933
T. T. MUNGER	Dec. 31, 1931	RALPH S. HOSMER	Dec. 31, 1933
W. G. HOWARD	Dec. 31, 1931	CLAUDE R. TILLOTSON	Dec. 31, 1933

Member in Charge of Admissions

W. G. HOWARD

Executive Secretary

W. R. HINE

Section Officers

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G. H. Wirt, Chairman, Department of Forests and Waters, Harrisburg, Pa.
R. D. Forbes, Vice-Chairman, Allegheny Forest Exp. Sta., 3437 Woodland Ave., Philadelphia, Pa.
H. F. Round, Secretary, Forester's Office, Pa. R. R. Co., Philadelphia, Pa.

Appalachian

E. H. Frothingham, Chairman, Appalachian Forest Experiment Station, Asheville, N. C.
Verne Rhoades, Vice-Chairman, P. O. Box 1927, Asheville, N. C.
W. K. Beichler, Secretary, N. C. Dept. Cons. & Devel., Asheville, N. C.

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Woodbridge Metcalf, Vice-Chairman, 231 Giannini Hall, Berkeley, Calif.
M. R. Brundage, Secretary, 332 Giannini Hall, Berkeley, Calif.

Central Rocky Mountain

Allen S. Peck, Chairman, Forest Service, Denver, Colo.
John W. Spencer, Vice-Chairman, Forest Service, Denver, Colo.
J. A. Donery, Secretary, Forest Service, Denver, Colo.

Gulf States

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